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THE INDICATIONS FOR OPERATIVE TREATMENT

TOGETHER WITH

SOME SUGGESTIONS AS TO
SURGICAL PROCEDURE

DESIGNED TO BE

A Concise Handbook for Ready Reference

BY

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I. INTRODUCTION.

The indication for surgical treatment is a most important consideration to the general practitioner and the surgeon. In all conditions amenable to operative treatment, a decision must be made regarding the time, during the course of the disease, at which the operation should be done, the best operative method to resort to in relieving the pathological condition, and the extent of the operative intervention that is warranted, or safe to be practised, in each case. In advising treatment for patients suffering from pathological conditions that do not clearly belong to the domain of surgery, care must be taken that a condition that could be relieved by operation is not overlooked, and, on the other hand, that surgery is not advised when the probable results would not justify the risk and inconvenience incurred by the patient. Of course, a definite and correct decision on these points depends on a positive diagnosis and good judgment; but I believe that although in some cases we cannot satisfy ourselves that the diagnosis is positive, we can arrive safely at a conclusion that surgery is indicated in attempting to give the patient relief. In some cases a positive ante-mortem diagnosis is impossible, as well as unnecessary, in giving the patient prompt and efficient treatment. If we may determine that these patients can, in all probability, be relieved by surgery, we should advise operative treatment although the exact pathological process from which the patient suffers cannot be ascertained.

In accidents and injuries it is usually easily determined that surgery is, or is not, indicated. However, such is not always the case. We all appreciate the difficulty and importance of determining positively what we ought to do in treating cases of injury with histories and symptoms that make us fearful that some serious internal damage may be present to demand surgical treatment. And we are beginning to appreciate, also, that in treating this class of cases we are not justified, in all instances, in waiting for symptoms or findings that enable us to make a positive diagnosis before advising surgical intervention. The question of advising operative treatment in cases of obscure injuries to the internal organs is so important that a positive diagnosis is not always necessary to order to advise for or against

operation. All we should attempt to do in these cases is to determine that operative treatment is, or is not, indicated.

In recommending treatment for accidents and injuries in which it is plain that surgery is indicated to assist in the repair of the damaged tissues, we must not lose sight of the fact that it is very necessary that we do only that which is indicated, and that we do it at the proper time. Of course it is important to know how to do what is required, but I believe that it is more imperative that we should know the indication to be met. It is my conviction that more mistakes have been made in determining what should be done than in doing it.

These statements are as true in dealing with acute inflammatory conditions as in treating accidents and injuries. Most men are qualified to operate properly on acute infections of the extremities, but few are capable of determining in which cases operation is indicated and, if so, at what time it had best be done. The same statements hold good regarding acute suppurative conditions in the abdominal cavity. Few physicians are unable to properly drain intra-peritoneal collections of pus, but many are at a loss to know when the operation is called for.

A clear understanding of the indications for surgical treatment is as essential to secure the best results in treating chronic affections as it is in acute conditions. It is more important that we should know under what circumstances to do, or to advise against a nephorrhaphy, a varicocele operation, or an operation on varicose veins of an extremity, than to be able to describe and to carry out a faultless technique of these procedures.

It is still more difficult and essential in these days of rapid surgical progress to fix the advisability of doing operations recommended for the relief of chronic interstitial nephritis, epilepsy, and other so-called medical diseases. Regarding these cases, we can find authority that will support almost any contention; but it is not easy to learn the truth. This may be a source of consolation in pondering over unfavorable results, but it is then too late to retrace one's steps. The various contradictory statements regarding the advisability of operative treatment for certain diseases should teach us not at once to assume a positive attitude, but should impress us with the fact that a clear comprehension of the indications for operative treatment is a most valuable consideration in medicine and surgery.

This subject again requires our closest attention when advising

treatment for patients who are suffering from well-recognized surgical conditions complicated with so-called functional diseases of the nervous system. Of course, it may be impossible in some of these cases to say that surgery is indicated; but this does not detract from the importance attached to making a proper selection. Many times the health, if not the life, of the patient depends on the decision for or against operation.

The foregoing brief, and necessarily incomplete, citations may clearly suggest the significance attached to advising the performance of surgical operations when we consider only the condition from which the patient complains. In many of these cases—with pathological changes that warrant operative treatment—there are also present independent and sometimes serious affections that should modify and in some instances entirely control our decision regarding the question of operation. The existence of a serious organic heart lesion, an advanced nephritis, diabetes, hemophilia, or a status lymphaticus cannot be disregarded. It is important in advising operative treatment for a patient that these independent complicating conditions should receive as much, if not more, consideration as the complaint that admits of operative treatment.

Although the value of arriving at a correct decision in advising operative treatment is well known, there is, it seems to me, a lack of discussion bearing directly on this subject. Of course the reason for treatment is based on the pathology of the disease, and the relation between the pathological changes and the symptoms, but too often the physician or surgeon is dependent entirely on his own resources to decide what should be done.

I shall not attempt—neither do I think it possible or advisable—to lay down definite rules that can be safely followed in advising for or against operative treatment in all cases. I shall be content if I succeed in setting forth what is generally known in such a way as to bear directly on making a decision for or against surgical procedures.

Our text-books of surgery, which necessarily many times serve as guides in advising operations, too often pass rapidly over this subject, leaving the man of limited experience entirely on his own resources in arriving at a decision. This may seem an extravagant statement, but it is by no means without foundation. We are all familiar with the fact that certain cases of dislocation of the outer end of the clavicle cannot be treated successfully without operation, while others

recover completely when the bones are held in proper position by a simple dressing. So far as I know, no writer of a text-book of surgery has taken the time and trouble to discuss, in a practical and convincing way, the indications for treating such cases. I quote this example because it is one of the many conditions on which sound advice regarding the indications for treatment is so hard to obtain.

In the following pages I shall discuss the indications for surgical treatment as I see them to-day. Little space has been given to a study of conditions on which the opinion of the profession is practically unanimous regarding the advisability of operative treatment.

In reviewing the subjects about which there seems to be doubt I have attempted to give both sides of the controversy; and if conclusions have been drawn I have endeavored to give the reasons for so doing.

I have purposely omitted mentioning many deformities. Some of them are so rare that I have deemed it advisable they should be left out; others are so thoroughly understood in respect to the indications for surgical treatment, that a discussion of them would be of no value.

The portions devoted to diseases of the eye, ear and other organs of particular interest to the various specialists, contain only discussions of the most common and important diseases and injuries that are likely to be met by the general practitioner.

II. CONDITIONS MODIFYING A DECISION TO OPERATE.

A decision to subject a patient to a surgical operation should by no means, in all cases, be based on the pathological process that indicates the operative procedure. A plainly recognized surgical condition that in one patient could be safely remedied by operation, would present a risk not to be lightly undertaken in another.

The personal equation of the patient should receive as much attention as his surgical disease, when determining the advisability of operative treatment. From the standpoint of results we cannot fail to see the wisdom of carefully viewing the patient as a whole, and not giving our undivided attention to one portion of his anatomy. It is not always easy to resolve the significance of general conditions regarding the advisability of performing surgical operations. For this reason, if for no other, we should give this subject careful study.

It is impossible, as well as undesirable, to make a classification, or to set down definite rules that can be safely followed in considering the relation of the personal equation of the patient to surgical operations. A heart, or kidney, lesion of sufficient severity to contraindicate general anesthesia in one patient, might not be a serious matter in operating on another individual whose general state presented a different aspect. It is not the study of one or two of the principal findings in the patient, but it should be the result of the careful study of the sum total of the entire examination, that should control our decision in advising for, or against, a surgical operation.

Although it is impossible to point out the exact significance of pathological processes that modify a decision to operate, I believe that there is more to be said on this important subject than is ordinarily found in our text-books of surgery. In the following pages I shall, as briefly as possible, attempt to point out the salient facts—as well as their significance—regarding the general conditions that are most commonly met with in arriving at a decision to perform a surgical operation.

CARDIAC DISEASES.

The existence of organic heart disease is a significant consideration in advising for or against the performance of any surgical opera-

tion. Although this is well known there is very little to be found of a definite character, regarding the relation of serious heart lesions to operative work. There is much discussion as to whether or not the anesthesia, or the shock, or hemorrhage resulting from the operation, should receive more attention. The observations of Stengel, Finney, Brunton and others clearly show that the anesthesia is not the most important point in the relations of organic heart disease to surgery.

It has been my observation that a compensating valvular lesion, occurring in patients under the age of forty years, should not be seriously regarded as a contraindication to advising a surgical operation. This statement, of course, does not hold good in all valvular lesions. It is generally agreed that mitral regurgitation is not to be looked upon seriously, especially if the general state of the patient is good. Although there has been little said regarding the seriousness of mitral stenosis in doing surgical operations, the preponderance of evidence clearly suggests that mitral stenosis does not differ in this respect from mitral regurgitation. Aortic regurgitation, however, is to be held more seriously. If this condition is present in a young patient it will doubtless be as easily handled as the mitral lesions, but if the patient has associated with his aortic regurgitation sclerosis of the peripheral vessels, we should well weigh the advice given for or against an operation.

Other well-known valvular lesions occur with such infrequency that no positive statement can be made regarding their significance in the giving of an anesthetic or performing an operation. When compensating valvular lesions occur in a patient over forty years of age, the condition should be looked upon as much more serious. In most of these cases, especially if the cardiac lesion is of long standing, we expect to find associated with the valvular changes more or less degeneration and fibrosis of the cardiac muscles. This is especially true in cases of aortic valvular diseases. In these cases it is the myocardial changes and the arterio-sclerosis that should receive more attention than the valvular defects.

In cases of chronic myocarditis, in which we have reason to believe that the heart has considerable reserve force, anesthesia and operation can be advised in most cases, if the patient is not over forty years of age. Any degree of myocardial change occurring in a patient over forty years of age is a serious affair in advising for or

against operation. If the myocarditis be associated with fatty degeneration, or with chronic and marked valvular changes, or with advanced changes in the kidneys or the vascular system, we should advise against all operations, unless they are of a life-saving character. The fatty heart, unassociated with valvular changes, is more dangerous and treacherous than an advanced myocarditis or advanced valvular disease. These cases are frequently overlooked on account of the latency of their symptoms. Strumpell, Von Leyden and others have shown that fatty degeneration of the heart rarely gives rise to symptoms, except in the later stages. It has been pointed out by Hasenfeld and Fennyvessy that cardiac enlargements are rarely present in cases of experimental fatty degeneration of the heart. For these reasons we must be careful to exclude or guard against the presence of a fatty degeneration when considering the performance of a surgical operation.

In most instances in which we are in doubt as to the advisability of doing the operation we are confronted, not with a plain valvular lesion, or with a disease of the heart muscle, but with a complication of these conditions. Mitral lesions, associated with a moderate degree of myocarditis, do not, in themselves, contraindicate the performance of a serious operation. Aortic lesions, associated with advanced myocardial and arterial changes, are to be regarded much more seriously. As a rule, if the heart is compensating, our advice should depend upon the amount of kidney change present. Serious compensating cardiac conditions, associated with mild degrees of nephritis, offer better risks for anesthesia and operation than do insignificant heart lesions associated with chronic and advanced Bright's disease.

On account of the frequency of complications in organic heart diseases it is difficult or impossible to determine if operation should, or should not, be advised in patients presenting marked lesions. Theoretically, we are unable to determine, with any degree of positiveness, what reserve cardiac force the patient may have, and we are also, in many instances, unable to determine that he will, or will not, stand, without danger, an anesthetic and an operation. On account of these difficulties certain clinical findings may be pointed out that may be of value in some cases.

In a patient suffering from organic heart disease, in whom the cardiac action and the volume of the pulse at the wrist bear a direct relation to each other, we are justified in assuming that he is a fair

risk on which to perform an operation of ordinary severity. If, however, the patient presents himself with tumultuous heart action, but with a feeble pulse beat at the wrist, we should consider the case of unusual risk. We should not advise such a patient to undergo an operation that can possibly be avoided.

Regularity of the heart's action is a valuable indication in advising for or against surgical operation. An apparently insignificant heart lesion, associated with irregular pulse, indicates a graver condition than does a pronounced lesion with a weak but regular pulsation.

The rapidity of the heart's action is not a positive indication of the cardiac strength. As a rule, however, it is unwise to submit patients to operative procedures if the pulse rate is over 120 per minute. I know of no exceptions to this statement in dealing with chronic diseases. In acute infections in which the operation consists of little more than opening an abscess cavity, and in which we may expect to terminate the process of infection by operation, a patient with a pulse rate of over 120 may at times be considered a good risk.

Very little, if anything, has been said touching the advisability of anesthesia or operation in patients suffering from Stokes-Adams disease. The reports of Edes and Johannesen give us no examples of operations being done on patients suffering from this affection. From the seriousness of the condition it is natural to suppose that operation should not be advised to patients suffering from Stokes-Adams disease unless it is a life-saving measure. (I have subjected a woman forty years of age, who was suffering from periodic attacks of syncope, with a permanent pulse rate of 28, to operation for appendicitis. The anesthesia and operation were unaccompanied by any unpleasant symptoms; the pulse rate remaining the same during the entire procedure.)

In cases of organic heart disease, in which the patient is suffering from incompetency, we should advise against all operative procedures, unless absolutely necessary to prolong life. If operation must be done, in these cases, we should resort only to palliative measures. Under no circumstances should a patient suffering from an incompetent heart be subjected to operation for a chronic and long standing disease.

The relation of the heart changes and other manifestations as shown by the clinical findings, should not mean the same to us in advising treatment for all surgical conditions. Mention has already

been made of the position that acute suppurative lesions hold in this regard. In studying the advisability of operating on patients suffering from malignant disease we should bear in mind that a heart lesion that would not contraindicate an operation for an acute suppurative process, would prevent us from advising surgical treatment for malignant tumor in almost any location. The same is true in considering the advisability of doing prolonged operations for benign growths or for chronic affections. Fibromas of the uterus are possible exceptions to this statement. Fehling, Dower, Fenwick, Sebileau and others have clearly shown that a certain amount of change in the myocardium may be expected to occur in chronic cases of uterine fibroids. A moderate degree of myocarditis, sufficiently severe to prevent us from operating upon a carcinoma of the uterus, would not prevent us from doing a hysterectomy for fibroids. One is led to agree with Pozzi, that many times chronic myocarditis presents an indication for the operative treatment of uterine fibroids.

Operations on the stomach, liver and upper abdominal region in general, are weighty considerations when the patient is suffering from an organic heart disease. These operations should not be attempted unless we are reasonably sure that the anesthetic can be taken without difficulty.

It is generally agreed that the choice of an anesthetic is a subject of importance in advising surgery to patients suffering from organic heart lesions. So much has been written on this topic, however, that I shall not attempt to discuss it. We may use ether in all of these cases, unless there is a marked endarteritis deformans present, and at the same time we have reason to believe that the muscular force of the heart is not unduly impaired. If the patient's cardiac reserve force is considerable, and the arterial tension high, we should not hesitate to use chloroform.

Local and spinal anesthesia should be substituted for general anesthesia when possible. Although local and spinal anesthesia are not without danger, the shock of an operation done under these circumstances is not so severe on the patient as the shock of the same operation added to the depression of general anesthesia. It is by no means true that operations done under local and spinal anesthesia are unassociated with any marked symptoms of depression. On the contrary the shock resulting from the injuries to the tissues and loss of

blood has as great an effect upon the patient when the pain is prevented with cocaine, as when a general anesthetic is given.

NEPHRITIS.

The significance of nephritis in connection with the advisability of performing surgical operations, depends on the degree and variety of the kidney changes; the existence of diseased conditions in other portions of the body; the severity of the operation contemplated, and the relation, if any, between the disease that requires operative treatment and the nephritis.

It seldom occurs that it is desirable or necessary to perform a surgical operation on patients suffering from acute nephritis. The majority of acute parenchymatous nephritides become chronic or terminate fatally. It not infrequently happens, however, that suppurative conditions require surgical operations while patients are in the acute stages of nephritis. Whenever such an operation is to be done it is advisable to avoid general anesthesia, if possible.

While as a rule it is desirable to avoid the doing of any surgical operation in cases of acute nephritis, we should not hesitate to undertake life-saving operations in these patients.

Patients suffering from advanced Bright's disease, associated with marked cardiac and vascular changes, should be submitted only to life-saving operations for injuries or acute conditions. We are not justified in subjecting these patients, under any conditions, to a major operation for any chronic condition.

The significance of renal changes as to the advisability of performing surgical operations is more difficult to determine in cases of chronic kidney changes than it is in the acute forms.

Patients suffering from moderate degrees of nephritis, associated with slight changes in the heart and vascular system, can be subjected to surgical operations, that are not too prolonged or too severe, with comparative safety. In arriving at a conclusion in these cases, the greatest difficulty presents itself in making a correct decision in those that are on the border-line of safe risks. No definite rules can be given that may be safely relied upon in deciding for, or against, operation in these patients. In all doubtful cases we should, if possible, delay operation until we have brought the kidneys into the best possible condition by preparatory treatment.

Patients showing marked amounts of albumen, without degen-

erative casts, should be subjected to repeated examinations to determine, if possible, the exact degree of the kidney involvement. The presence of albumen, associated with hyaline and granular casts in moderate quantities, does not contraindicate an operation of moderate severity, provided the cardiac and vascular changes are not marked. The continuous presence of degenerative casts, with little or no albumen, but associated with high arterial tension and cardiac hypertrophy, suggests a serious condition. No major operation should be undertaken in these cases, unless it is a life-saving measure made necessary by an accident or an acute disease. A marked diminution in the excretion of urea, associated with a slight albuminuria or a few casts, must be regarded more seriously than the presence of a larger number of casts, or more albumen, with a normal output of urea.

The presence of pus in the urine has a variable significance. Its importance depends entirely on the location and extent of the infection. Pyuria may not interfere with anesthesia or operation; or it may be an absolute contraindication for all operative treatment.

This subject receives detailed consideration in the discussion of the suppurative diseases of the urinary organs.

A kidney lesion varies in seriousness according to the character of the operation contemplated. Prolonged operations, or operations producing a considerable amount of hemorrhage or shock, have a trying effect on the kidneys. This statement does not hold good in certain conditions that are responsible, to a greater or less extent, for the kidney changes. Pelvic growths or adhesions that produce or aggravate kidney diseases, offer an unusual indication for operative treatment.

The dangers attached to operating on patients suffering from pathological conditions in the kidneys are not from the anesthetic alone. In these cases infection is a common occurrence. It has been shown by Flexner that lesions of the kidneys may impair the powers of resistance of a patient and allow certain organisms, that under other conditions would be practically harmless, to produce a post-operative infection of sufficient severity to terminate the life of the patient.

GLYCOSURIA.

Transient glycosuria is not a serious occurrence in relation to surgical operations. Although we do not know the exact pathological

changes underlying transient glycosuria, it is generally agreed that the condition is not sufficiently severe to interfere seriously with anesthesia or operative procedures. In the great majority of instances it is safe to disregard transient glycosuria in advising surgical treatment. If the pathological condition for which operation is to be done permits, it is wise to subject these patients to a course of preparatory treatment before operating on them.

Diabetes mellitus is generally held to be a serious affection, and is ordinarily looked upon as a positive contraindication to major operative work. It has been generally taught that diabetics stand operations badly. They are supposed to be especially susceptible to the bad effects of anesthesia; to be liable to develop diabetic coma after anesthesia or operation, and to succumb readily to shock and infection. Some authorities intimate that an operation wound may rarely be expected to heal in a diabetic patient. The profession has been generally warned that diabetic coma, sloughing and gangrene of the operation wound, and sepsis, might be expected if a patient suffering from unquestionable diabetes mellitus was subjected to a major operation.

The foregoing statements, which seem to coincide with the views held by a number of operators, are certainly not based on clinical experience and facts. These conclusions have probably resulted from observations made on cases suffering from diabetic gangrene or extensive suppurating conditions. Gangrene and extensive suppuration differ markedly from comparatively aseptic pathological conditions in the estimation of results following operations done on diabetic patients.

A careful study of the cases collected by Noble, Phillips, and others—recording operations done on patients suffering from diabetes—shows us that, many times, diabetic patients withstand surgical operations very well indeed.

The collection of 69 cases of surgical operations done on patients suffering from diabetes mellitus shows a mortality of 24 per cent. Fifteen of the 69 operations were done for carcinoma of the breast. These patients were from 50 to 65 years of age. Most of them had a severe degree of diabetes that was of long standing. Only two of these patients succumbed to the operation, or to complications arising from it. Rosenberger's patient, who was 61 years of age and had suffered from diabetes for six years, stood the operation well but

died as the result of a secondary infection of the wound that occurred on the fourteenth day following the operation. Tuffier's case, a woman 64 years old, showed no serious symptoms during, or after, the operation until the fifth day. At this time she developed an erysipelas which proved fatal. The remaining thirteen cases made uneventful recoveries. In only two, those reported by Fisher and Willett, did suppuration of the wounds occur. This list of cases shows clearly that anesthesia, and moderately severe operations on diabetics are not likely to be followed by diabetic coma, or diffuse suppuration or gangrene, if infection is not present previous to the operation.

The reports of the 31 cases of operations done on the female generative organs of patients suffering from diabetes mellitus, show eight fatal results. In five of the fatal cases the operations consisted of rather prolonged and serious procedures for cancerous involvement. The patient operated upon by Hirst succumbed on the fifth day to diabetic coma. The operation was an ovariectomy for a cystoma. The patient was 60 years of age; had 4 per cent. of glucose in the urine for a number of years, and was suffering from an advanced degree of hepatic cirrhosis, with an enormous ascites. The case reported by Loeb died after a prolonged and difficult operation for bilateral dermoids with numerous adhesions. The cause of death in seven of these cases was diabetic coma. In Futh's case the coma occurred on the eighth day. In the case reported by Landau the symptoms of coma came on as early as the second day following the operation. In the majority of the fatal cases the comas developed between the fifth and the seventh days.

In two cases, those reported by Kleinmachtes and by Reyner, the operation wounds healed very slowly. In all of the others, the post-operative progress did not differ materially from that expected in non-diabetic patients.

The seventeen cases of abdominal operations on diabetic patients for conditions other than gynecological diseases, show eight fatal results. Four of these cases, those reported by Naunyn, Railton, Deaver and Pagenstecher, died from diabetic coma. A death from sepsis occurred in a diabetic patient following an operation for acute appendiceal abscess that was performed by Deaver under local anesthesia. Death occurred in the patient operated upon by Ball for pancreatic cyst, two months after the operation had been performed.

The urine of this patient contained 5 per cent. of sugar. Churchton lost a case from sepsis following a laparotomy for a pancreatic cyst.

In four of the seventeen abdominal operations in patients suffering from diabetes mellitus the operative wound presented failure of repair. In the case reported by Barker, a colotomy for carcinoma of the rectum, the wound showed no tendency to heal. In Fisk's patient, an operation for suppurative appendicitis, the wound healed slowly by granulation. In one of Barker's cases, a radical operation for umbilical hernia, repair was delayed, but complete. In the case reported by Reynier, an operation for umbilical hernia, the wound was slow in uniting firmly.

The results in this large number of serious operations on diabetic patients clearly indicate that the importance of diabetes mellitus as a contraindication to performing surgical operations, has been overestimated. They show us that the greatest danger in these cases is from the development of diabetic coma, which, in all probability, is precipitated by a combination of the effects of the anesthetic and the shock of the operation. It is possible that infection may play an important role in the development of diabetic coma. So far as I am aware there is no way of determining when diabetic coma may be expected to follow an anesthesia or operation. Neither do we know of any measures that can be employed to prevent its occurrence. Preparatory treatment, of course, should precede operation in all of these cases, unless the surgical indication is so urgent as to render it impossible.

The point of second importance in advising for or against operation in diabetics is infection. A major operation, on a clean case, presents a better risk than a comparatively simple operative procedure if infection be present. The opinion is given that we should limit operative procedures for infectious conditions to simple drainage; and that if a diabetic patient desires treatment for a suppurative condition, in which the pus has an avenue of escape, operation should be refused.

If it becomes necessary, or advisable, to subject a diabetic patient to operative treatment local or spinal anesthesia should be employed if possible. An operation requiring general anesthesia should not be performed if the condition is a chronic one and does not produce serious symptoms. We are justified in advising surgical operations for diabetics if we have reason to believe that the operation will

give complete relief, and that the pathological condition for which we operate is of such a character as to threaten the life of the patient. As has been stated previously, the general and the urinary examinations will rarely reveal facts that can be relied upon in advising for or against an operation. The advice of Noble appeals as being of value regarding the significance of urinary findings in recommending operations for diabetics. He, as a rule, postpones operation if more than 2 per cent. of sugar is found in urine that is excreted to the amount of three pints in twenty-four hours.

The indications for surgical treatment for conditions resulting from diabetes mellitus are discussed in another section under the heading of gangrene.

HEMOPHILIA.

An hemophilic patient should never be subjected to any operation, no matter how trivial, unless it is a life-saving measure, made necessary by an injury or an acute condition.

Minor operations on the nose or throat should not be undertaken in these patients. It is better for the patient to suffer from the inconvenience of the disease, that ordinarily would be considered suitable for surgical treatment, than to be exposed to the risk of fatal hemorrhages that so often occur when hemophilics are operated upon. Hypertrophied tonsils should not be removed when the patient gives a clear history of hemophilia. Stucky has recently reported a death from hemorrhage following a tonsillectomy in a hemorrhagic boy fifteen years of age. Adenoids and nasal growths should not be interfered with in bleeders. Sachs has reported a case of fatal hemorrhage following the removal of adenoids in a hemophilic seven years of age. Martin has recently described a similar case.

In the great majority of instances there is little excuse for subjecting hemorrhagic patients to operative procedures. A careful study of the histories of these patients will, in almost every instance, reveal the existence of a hemorrhagic diathesis.

If operation becomes necessary in these cases it is generally held that females offer better risks than males. So far as known, we are likely to find hemophilics in all classes of patients. It has been known for a long time that the disease is of exceptional occurrence in negroes. Although it is doubtless true that the negro is not so frequently the victim of hemophilia as is the white man, it has been shown conclu-

sively that he is by no means exempt from the disease. Haddock and Steiner have each reported cases of hemophilia occurring in negroes.

STATUS LYMPHATICUS.

The exact significance of status lymphaticus in relation to anesthesia and surgical operations has not been definitely determined. Although the exact pathology and nature of the condition is not known, clinical experience and accidental happenings impress us with the responsibility incurred by subjecting a patient with a lymphatic constitution to anesthesia or operation. On account of the unsettled state of the whole subject of status lymphaticus, it will not be out of place here to consider briefly the nature of the condition, its significance in relation to anesthesia, trauma and operations; and to call attention to some of the characteristic points to be looked for in determining that a patient is suffering from the disease.

There are three distinct views regarding the nature of status lymphaticus that are of sufficient importance to warrant attention. Lang, Konig, Siegel and others, claim that the thymus gland is the seat of the primary and most important change, and that the other changes throughout the body are only secondary associations. They are of the opinion that in most instances of sudden death, occurring in patients with a lymphatic constitution, compression from the enlarged thymus can be held directly responsible for the fatal issue. Konig and Siegel have each reported cases of patients suffering from serious symptoms due to enlargement of the thymus gland. These patients were subjected to partial resection of the thymus, with fixation of the remaining portion. In both cases complete and permanent relief followed the operations.

Gwyer thinks that the clinical and pathological findings in patients suffering from status lymphaticus suggest strongly that the condition may be the result of infection with the tubercle bacillus. He is rather inclined to look upon the lymphatic constitution as a general state not unlike a chronic tuberculous infection, and that the changes in the thymus, the lymphatics, and other organs, are secondary developments to the general change resulting from the infection. Ewing is inclined to look upon Gwyer's theory with favor; but as no bacteriological evidence can be had in support of Gwyer's contentions I believe that we are justified in assuming that it is improbable

that the tubercle bacillus bears any definite or constant relation to the condition ordinarily known as the lymphatic constitution.

The generally accepted opinion regarding the nature of status lymphaticus corresponds closely to the theory of Paltauf. This observer believes that there exists in patients with a lymphatic constitution a general lymphatic hyperplasia, and that the involvement of the thymus is only a part of this general change and not a primary or underlying factor in the disease.

Little is known regarding the significance of the lymphatic constitution in relation to the general condition of the patient. We have good reason to believe, however, that all of these cases have low resisting powers and that they withstand injury, shock, anesthesia and operation badly.

Clinically there are many occurrences that impress us with the responsibility attached to subjecting patients with a status lymphaticus to anesthesia or operation. Blake, Ewing, Gwyer, Bovaird and others, have reported fatal cases following anesthesia and trivial operations. It has been maintained by some that the great majority of deaths from anesthesia occurs in patients suffering from a lymphatic constitution. Kundrat has collected ten cases of deaths from chloroform administration in which an enlarged thymus and general lymphatic hyperplasia was present in each patient. Others have held that there is a direct relationship between status lymphaticus and diseases of the thyroid gland. Some writers believe that not a few of the deaths following operations upon the thyroid gland for exophthalmic goitre, were due to the lymphatic constitution. Kundrat and Gluck have reported examples of death occurring in patients with status lymphaticus, who were subjected to operative treatment for simple goitres. The number of fatal results following anesthesia or operation in patients with lymphatic constitutions show conclusively that an unusual risk is incurred, not only in anesthetizing these patients, but by subjecting them to slight degrees of shock. Nordman and Paltauf have reported deaths occurring in persons who fell into the water but could not have died from drowning. These cases are supposed to be examples of deaths occurring from slight shock in patients with lymphatic constitutions.

Although, as has been stated in the foregoing, we have no positive knowledge regarding the exact significance of status lymphaticus in relation to surgical operations, clinical observations are sufficiently

convincing to impress us with the importance attached to advising surgical treatment for these patients. They are especially susceptible to shock, they react slowly to trauma and they show slight resistance to infections. Anesthesia, or operative procedures without anesthesia, should not be advised to these patients except as life-saving measures. Of course it is possible and probable that many of these patients have recovered from anesthesia and operation without presenting serious symptoms. Nevertheless, serious accidents occur so frequently in this class of cases that we are not warranted in subjecting them to such serious risks except to relieve very grave and fatally-tending conditions.

On account of the importance of the relation of status lymphaticus to anesthesia and operation; and on account of the indefinite pathology and symptomatology of the disease, a few words concerning the recognition of it will not be out of place.

In some instances it is difficult or impossible to make an ante-mortem diagnosis of status lymphaticus; yet, in most cases a careful examination will elicit findings that at least strongly suggest the presence of the affection, if not positively prove its existence. A careful examination of the superficial lymphatics, the tongue, the naso-pharynx, the fauces and thymic region, will, in most instances, reveal the disease if it is present. Examinations of the spleen and blood are usually of little value. A diagnosis, in these cases, must not be based on the presence or absence of any definite finding, but must be made from the general aspect of the patient, associated with other signs or symptoms that are known to be more or less characteristic of the condition. In arriving at a conclusion in children, attacks of laryngismus stridulus or dyspnœa, enlargement of the thyroid gland, or rachitis, would suggest the presence of a status lymphaticus—even in the absence of a marked general lymphatic hyperplasia or excessive enlargement of the thymus gland. In making a diagnosis of the lymphatic constitution in adults, attacks of syncope would have the same significance that would be attached to paroxysms of laryngismus stridulus or dyspnœa in children.

ANEMIA.

The importance of general anemia in relation to surgical operations cannot be positively determined in all cases. A moderate de-

gree of anemia would present a more serious aspect in one patient than would a severe degree in another.

As a rule acute anemia or anemias of short duration are not to be considered as serious contraindications to surgical operations, even if the anemia be severe. An anemia of long duration is quite another matter. If a patient has been suffering from anemia for a considerable period of time it is well to follow the advice of Mikulicz, who believes that we should not subject a patient to any surgical operation if his hemoglobin percentage is not over thirty; and that hemoglobin percentages below fifty should be considered seriously in advising for or against operations.

No doubt the significance of anemia, regarding the advisability of performing surgical operations depends to a great extent upon the kind of operation that is contemplated. Life-saving measures for injuries or acute infections should be performed regardless of the condition of the patient's blood, excepting in cases of acute hemorrhage. If an operation is to be done for a chronic condition, the anemia of the patient should receive special consideration. The rule of Mikulicz should be followed in treating all these patients. If by preparatory treatment we do not succeed in raising the percentage of hemoglobin to fifty we are justified in assuming that the patient presents an unusually severe risk for a prolonged or serious operation.

CACHEXIA OF MALIGNANT DISEASE.

Cachexia dependent on malignant disease usually presents a positive contraindication to the performance of any major surgical operation. If the malignant disease has advanced to such a degree as to produce cachexia, very little can be expected in the way of permanent relief by subjecting the patient to operation. There are, however, certain exceptions to this statement that are met with sufficiently often to deserve mention.

In superficial, or ulcerating and infected malignant growths, the degree of cachexia does not always indicate the extent of the malignant disease. Many times the cachexia in these cases is as much dependent upon the subsidiary infection as on the malignant growth. It not infrequently happens that operation is indicated in these cases, not with the expectation of producing a radical cure, but with the idea of converting an ulcerated and infected area into a clean and skin-covered tumor. Although recurrences are to be expected after opera-

tions of this character the benefit to the patient from removing the infection is sufficiently marked to more than justify the undertaking.

In some instances it may be advisable to operate on a malignant growth that on account of its location produces severe pain—even though the cachexia is well marked and little hope remains for securing a permanent result.

Malignant growths involving the gastro-intestinal tract, and interfering seriously with the nutrition of the patient, should in most instances be subjected to at least palliative operations. In these cases the general condition of the patient does not fairly represent the extent of malignant involvement.

Malignant growths that, on account of their mechanical pressure, produce acute life-threatening symptoms, will, in most instances, demand the performance of some operation. Palliative operations are justifiable in these cases, even when cachexia is marked. We are not warranted in allowing a patient to die from intestinal obstruction caused by a carcinoma of the bowel; from urinary retention due to malignant involvement of the urinary tract; or from asphyxia resulting from malignant stenosis of the larynx. These patients should be subjected to palliative operative procedures regardless of their general condition.

SHOCK.

The significance of shock in relation to surgical operations, applies almost exclusively to the treatment of accidents and injuries.

No patient, who is in profound shock, should be subjected to any operation except to stop hemorrhage. If a patient is suffering from severe shock, and at the same time is losing blood, no time should be lost in doing whatever may be necessary to stop the hemorrhage, notwithstanding the shock. Under these circumstances the operation should be no more extensive than is absolutely necessary to stop the bleeding.

Most operators to-day agree that it is better for the patient in most instances, to delay operating until the acute symptoms of shock have subsided. Pirogoff says that if any operation must be done while the patient is in profound shock, it should be done under local anesthesia.

Before the use of anesthetics became general it was the rule to operate while the patient was in shock. Larrey, Pare, Wiseman, Du-

boys and McLeod believed in this practice. They were doubtless correct in their conclusions if general anesthesia was not to be employed. An operation without anesthesia would evidently not be so severe on the patient if done while he was in profound shock, as it would if performed later when his nervous system had regained its susceptibility. If general anesthesia is to be used, the shock, anesthesia and operation would have a more depressing effect on the patient than would the anesthesia and operation after the severe symptoms of shock had subsided.

ACUTE HEMORRHAGE.

Acute hemorrhage is a positive indication for mechanical treatment in all cases. If compression or constriction cannot be employed to control the hemorrhage effectively, immediate operation is required. General treatment, in the way of stimulation or transfusion, is positively harmful if the bleeding has not been stopped.

In resorting to surgical measures to stop hemorrhage the indication does not extend beyond the closure of the bleeding vessels. In many instances it is necessary that more should be done, but it is not wise, if the patient is in a serious condition, to do more at the primary treatment than to stop the hemorrhage. When the bleeding is once controlled the indication is to sustain the patient so that he may overcome the effects of the loss of blood and the shock.

Operative procedures for the repair of injuries or pathological conditions associated with exhausting hemorrhage should not be undertaken until the patient has recovered, to some degree, from the acute anemia. The length of time that operation can be delayed with safety in these cases depends entirely on the location of the injury or pathological condition, and the probability of early infection occurring. Although it is true that in most cases of injury the loss of blood is not sufficient to contraindicate operation for the repair of the injured tissues, it occasionally happens that a few hours' delay will do a great deal for the patient in allowing him to recover from the excessive sudden loss of blood. We should never neglect to give the patient this opportunity when it is possible to do so, especially when his condition seems to indicate it.

AGE.

The age of a patient is not an important element regarding surgical operations. It is generally believed that the very old or the very

young are not desirable subjects for operative treatment, but experience, based on a large number of cases, will not confirm this conclusion.

Infants, as a rule, resist operations well. It is true that they do not recover rapidly from hemorrhage, and perhaps do not bear prolonged operations as well as do adults; but if we avoid severe bleeding, and do not unduly prolong our work we shall have little difficulty in doing ordinarily severe operations on very young children.

The very old, in many respects, resemble the very young. As a rule they have considerable reserve force, and withstand ordinary operations very well indeed. They do not, however, recover from the loss of blood as rapidly or as easily as do those in middle life; neither do their vascular or excretory systems bear prolonged anesthesia without inconvenience; but if the operation is not too extended and the loss of blood too great, they usually make a prompt and satisfactory recovery. What may be considered the most valuable element in operating on very old people is the avoidance, post-operative, of the recumbent position. These patients should be placed in the sitting posture as soon as possible after the operation has been performed. No matter what the operation may have been, much is gained by keeping these patients thereafter in a sitting position as much as possible. We seldom see any bad effects from allowing very old patients to sit up very shortly after being operated upon; and it is quite certain that the avoidance of the recumbent position is a most important factor in securing early and satisfactory results in this class of cases.

OBESITY.

As a rule obesity, in itself, is not a contraindication to the performance of any operation. Very obese patients, however, are not good risks for prolonged and serious undertakings. They are likely to take an anesthetic badly, and are more often the victims of post-operative pneumonia than are less obese individuals. Most very obese patients have a diminished resistance. They do not stand severe hemorrhage well; they react slowly to shock; and they offer a diminished resistance to infection.

Very obese patients, in late life, are prone to have hearts possessing little reserve force. The condition of the cardiac muscle therefore should receive particular interest in advising operations in this class of cases.

While obesity alone is not a serious factor in the question of an operation, it is of sufficient significance to warrant special care in dealing with these patients.

SYPHILIS.

Syphilitics, as a rule, stand anesthesia and operations without difficulty.

Patients suffering from active syphilis, however, should not be operated upon unless it is an absolute necessity. If possible the operation should be delayed until the syphilis is under control.

TUBERCULOSIS.

Patients suffering from tuberculosis usually pass through operations well. Their post-operative course, however, is sometimes far from satisfactory. If the operation attacks the tuberculous infection, the patient's course, during and after the operation, is usually attended with no unpleasant happenings. If a tuberculous patient is subjected to an operation for a condition independent of the tuberculous infection, the post-operative course of such patient depends entirely on the extent of the tuberculous involvement. Patients suffering from a tuberculous infection that is sufficiently serious to produce a marked change in their general condition, should be subjected to no serious operation unless it is demanded as a life-saving measure.

PREGNANCY.

Pregnancy in itself is by no means a positive contraindication to the accomplishment of almost any surgical operation. The reports of Mann, Thoman, Kelly and others have shown conclusively that pregnant women, as a rule, withstand surgical operations very well. The early, unsatisfactory reports of operations done during pregnancy have been shown by Runge to be in a large measure the result of infection. The reports of cases operated upon by modern methods are very encouraging regarding surgical operations during pregnancy.

The chief danger in this connection is abortion, but the frequency of abortion following surgical operations has been overestimated. As a rule it is not likely to follow any operation, provided the patient is not infected, and the uterus is not dealt with too severely.

Although it is generally agreed that pregnant women may be subjected to most operative procedures without producing serious symp-

toms, no operation should be performed on a pregnant woman unless it is an absolute necessity. If operation is decided upon, and is undertaken during pregnancy, every possible precaution should be used to prevent infection and to avoid, as much as possible, direct interference with the uterus.

Operations done during pregnancy may be divided, from a standpoint of the indications for performing them, into two classes: 1, Operations on the generative organs; and 2, Operations in other portions of the body.

As a rule pregnancy does not offer a contraindication to surgical operations on organs outside of the pelvic cavity. Operations for injuries, or acute infectious conditions, or malignant growths, should be done in all cases in which the pregnancy has not advanced to the stage at which the child becomes viable. During the later months of pregnancy the demands for operation must be more exacting. At this time the life of the child must receive as much, if not more, consideration as that of the mother. It is necessary, for the justification of an operation during the later stages of pregnancy, that the condition for which the operation is indicated should produce serious symptoms, or threaten a speedy termination of the patient's life.

Intra-abdominal operations, during pregnancy, present a more momentous aspect, regarding the occurrences of abortion, than do operations on the extremities or head. Operations on the female breast are not especially liable to be followed by abortion.

Operations on the female generative organs during pregnancy should, in most instances, be avoided. Operations on the vagina are rarely called for during this period. Acute suppurations, or malignant growths involving the external genital organs, should be subjected to operation regardless of the existence of pregnancy. Pedunculated uterine polypi, extending into the vagina, can be removed with safety. All chronic conditions of the vagina and external genital organs should be left alone during the gestation period.

Ovarian cysts or solid growths in the ovaries should not be removed during pregnancy unless they produce untoward symptoms or, on account of their position, are likely to interfere seriously with pregnancy or childbirth. If the ovarian growth is malignant immediate operation is indicated unless the mother is to be confined in a few weeks. Torsion of the pedicle of an ovarian cyst is usually an indication for an operation even if the pregnancy is well advanced.

It has been shown quite conclusively that ovariectomy during pregnancy is usually not followed by serious symptoms. Ovariectomy rarely produces abortion unless infection is present. Heiberg has shown that the majority of ovarian cysts are, during pregnancy, serious considerations both to the mother and child. In his collection of 271 cases in which operation was not done, the cysts could be held responsible for the deaths of 25 per cent. of the mothers and 66 per cent. of the children. Weiss, Dsirene, Mainzer and others give us reports much more favorable than those of Heiberg to show plainly that surgical interference is strongly indicated for all ovarian cysts or solid growths that are likely to produce unpleasant symptoms during pregnancy or parturition.

Operations on the pregnant uterus are rarely indicated. If a pregnant uterus is subjected to severe manipulation, or to extensive incision and suturing, abortion usually follows. If a pregnant uterus is retroverted and incarcerated, and the displacement cannot be overcome by vaginal manipulation, an abdominal incision should be made and the organ replaced. Michie has reported a case in which this procedure was carried out successfully.

Uterine fibroids rarely call for operative treatment during pregnancy. If a pedunculated fibroid produces severe pain, or on account of its position is likely to interfere with delivery, it should be removed by operation during the early stages of pregnancy. If fibroids of this character are not recognized, or do not produce symptoms until pregnancy is well advanced, operation should be delayed, if possible, until the child is at full term. Then a Cesarean section, with proper treatment of the tumor, will doubtless be indicated, if spontaneous delivery is impossible. Interstitial fibromata, or extensive fibromatous involvement of the entire uterus, should not be operated during pregnancy. Operations for these conditions are almost invariably followed by abortion. If the condition is so serious that it threatens to terminate the patient's life in a short time, complete hysterectomy should be done. In these cases the life of the child should be disregarded if life-threatening symptoms occur during the early months of pregnancy. If the pregnancy has advanced to its later stages, before the life of the mother is in danger, operation should be delayed if possible until Cesarean section, followed by hysterectomy, can be done with safety to the child.

Carcinomas of the uterus that are not too far advanced to war-

rant an attempt at complete removal, should be treated by complete hysterectomy, regardless of the pregnancy. The chances of a full term child being born under these conditions are too slight to sacrifice the life of the mother. If pregnancy occurs in a patient with a carcinoma of the uterus that is too far advanced to warrant radical operation, the life of the child should be considered in preference to that of the mother.

Acute infections in the pelvis that produce serious symptoms, and that can be relieved by surgical treatment, should be operated upon during any stage of pregnancy. If large collections of pus are present vaginal drainage is all that is necessary to give relief in most cases. This, as a rule, can be safely done. Abscesses of the uterine appendages that are situated too high in the pelvis for vaginal drainage, should be attacked through an abdominal incision. Operation in these cases is of great benefit to the mother, and does not offer a serious risk of producing an abortion. Several successful instances of this character have been recorded.

Extensive adhesions resulting from previous infections may produce distressing symptoms during pregnancy. Operation should be advised for all of these cases in which the symptoms are severe.

Serious hemorrhage, resulting from the tearing of vascular adhesions during pregnancy, is an indication for operation. Murphy has reported one such case that was operated successfully.

DISEASES OF THE NERVOUS SYSTEM.

The condition of a patient's nervous system should always be taken into consideration in recommending an operation. As a rule the indications for the surgical treatment of injuries and acute conditions are not modified by any nervous symptoms that a patient is likely to present, but surgical treatment for chronic affections presents a different aspect regarding the nervous condition of the patient. Those who are "very nervous," or who express great fear of succumbing to the effects of surgical operations, commonly are susceptible to shock, and make slow recoveries from serious operative procedures. Any unpleasant symptoms that occur during the convalescence of these patients are frequently looked upon by them as forerunners of the fatal issue that they had declared would occur. Although it is undoubtedly true that the mental state of the patient does not materially interfere with the post-operative course, it is of

sufficient importance to be taken into consideration. Some of these patients cause so much anxiety that it is the custom of some to refuse to operate on them unless the occasion is very urgent.

Neurasthenics generally endure operations well. Primary neurasthenia is not a contraindication for any surgical operation. Of course it is not to be expected that the operation will cure the patient of his primary nervous condition—for that, to a great extent, exists independently of his surgical disease. Patients who are suffering from secondary neurasthenia—nervous symptoms dependent on pathological conditions outside of the nervous system—should be subjected to operative treatment without hesitation. In the majority of such cases the neurasthenia will be markedly improved, if not entirely relieved, by operation.

Hysterical and epileptic patients should have the same consideration, from the standpoint of surgical treatment, as other individuals. They should be operated upon when the indications are clear; but they should not be subjected to operations, when the findings are obscure, with the hope that the surgical interference will relieve the nervous system.

Patients who are suffering from melancholia, or who give a family history of insanity, should not be subjected to surgical operations unless absolutely necessary. It has been estimated by Kelly that one-half of one per cent. of all patients undergoing gynecological operations develop temporary or permanent insanity. It is generally agreed that those who have suffered from previous attacks of insanity; who are subject to melancholia, or who give a clear family history of insanity, are prone to become insane after operations, or even after being anesthetized. The reports of Noble, Kelly and others, are sufficiently convincing to warn us of the responsibility attached to advising operations for this class of patients. If the family history or mental condition of the patient suggest that an operation might be followed by some nervous derangement, the suspicion should be announced to the relatives of the patient.

No operation should be undertaken on those who have suffered from attacks of insanity, or who give a family history predisposing to it, without due consideration of the possible effect of the operation on the patient's mental condition.

Surgical operations for trivial conditions, or for diseases that do

not interfere seriously with the patient's comfort, should not be performed on this class.

If an individual has already become insane the presence of the insanity does not contraindicate the performance of any surgical operation that is necessary. Such patients go through operations well, and are as much entitled to surgical relief for their physical ailments as are those of sound mind. Operations, however, should not be undertaken in the insane with the hope of improving their mental condition. Although improvement, and even relief from the insanity, occasionally follows surgical operations there is no good reason to believe that these cures can be expected to occur other than as accidental happenings. The relation of the insane to surgical operations has been well expressed by Mayo: "The insane, from a surgical standpoint, have the same right as the sane—no more, no less."

III. ACCIDENTS AND INJURIES.

Operative treatment is indicated in cases of accidents and injuries to stop hemorrhage, to combat shock, and to assist nature in repairing the injured tissues.

The first indication in all cases of injury is to stop acute hemorrhage. If the patient's condition is serious nothing should be done at the primary treatment except the arrest of the arterial and the profuse venous bleeding. The various methods, local and general, that are ordinarily employed to arrest hemorrhage are thoroughly discussed in works treating of the technique of surgery, and cannot properly be entered upon in this place. No extensive operation is justifiable to arrest hemorrhage in any case. If the hemorrhage is not severe and the patient's general condition is good the operation that is indicated to arrest the bleeding may be performed at the same time that measures are instituted to assist in repair of the injury.

The treatment of shock, which is the next indication to be met in all cases of accidents and injuries, should be dealt with after the acute hemorrhage has been controlled. The advisability of performing extensive operations in cases in which the shock is severe has been spoken of under the general indications for performing operations.

In doing operations upon patients who have received injury the prevention of infection must always be considered. In all superficial wounds complete cleansing should be done before a repair of the tissue is attempted.

In all subcutaneous injuries no operation is indicated immediately after the injury has occurred, unless it is to stop hemorrhage or to repair a perforation of an internal organ. The advantage of not operating upon these cases at such time is that the tissues are then lowered in resistance and infection is likely to follow if an incision is made into these contused and infiltrated structures. Tendons that have been ruptured subcutaneously, nerves that have been torn, and bony injuries that require operative treatment, should not be repaired until the acute reaction following the trauma has subsided and the extravasated blood has, at least in part, been absorbed.

In treating open injuries, exploration and disinfection are indicated in all cases if the injury has resulted from direct trauma. If the skin wound in these cases is the result of an indirect force, and

bones of the extremities or fractured ribs have been pushed through the integument, no cleansing is indicated except that of the superficial wound. In these cases it is impossible for infection to have been implanted into the deep structures, and if mechanical cleansing of the deeper portions of the wound should be attempted it is very probable that infectious material will be carried into areas that otherwise would have remained clean. This advice should be carefully followed in dealing with all cases of compound fracture.

Another precaution against infection occurring in open wounds is drainage. It is not necessary that every case should be drained, but I believe that none of these injuries should be sealed. The suturing in all of these cases should only approximate the tissue, and there should be left between each of the sutures a small opening. If a moist dressing is applied to a wound treated in this manner a considerable amount of primary wound secretion will escape into the dressing. This materially aids in relieving superficial infection, while the gaps left between the sutures close rapidly from the swelling of the cut surfaces.

The presence of foreign bodies in the wound of course, predispose to infection. These should be removed in all cases unless the foreign body happens to be a bullet that is lodged deeply in the tissue. Primary removal of a bullet that has gone a considerable distance into the body should never be undertaken from the standpoint of preventing infection.

In extensively lacerated injuries, badly contused and damaged tissue should be removed at the time of the primary dressing. Removal of this devitalized material aids decidedly in repair, assists in cleansing the wound and does a great deal to prevent infection.

Wounds of the mucous membrane should be sealed in every instance with a material that is not absorbed by the secretion that constantly is present in these locations. Compound tincture of benzoin is very useful in sealing all operative or accidental wounds on mucous surfaces.

IV. ACUTE INFLAMMATIONS.

The operative treatment of acute inflammations should be limited to drainage in all cases. Occasionally an amputation will be required for acute, extensive and rapidly progressing inflammation of an extremity, but if these cases are treated properly amputation will rarely be called for. If an indication is present for drainage in an acute inflammation, the operation should consist of simple incision. The removal of inflammatory tissue, curetting of abscess cavities, the application of chemical substances to the inflamed tissue, or irrigation, are never indicated in treating acute inflammatory conditions.

The operative treatment for acute inflammations following injuries should consist of reopening of the wound only. If the inflammatory process has extended for a considerable distance beyond the seat of the injury, incisions for the relief of tension are never indicated unless localized collections of pus are present. These cases are best treated by absolute rest and the application of heat before supuration occurs. The objection to incision is that we do not reach all points of the infection, and if the patient recovers an abundant scar formation occurs which not infrequently limits the motion of the extremity.

If an acute and serious infection develops as the result of a very slight injury, or from a punctured wound, no operative treatment should be advised unless localized collections of pus are present. Many times an incision at the seat of the infection atrium will be of benefit, but no incision should be made into the inflammatory tissue at a distance from the injury. The same treatment applies to subcutaneous, acute, inflammatory processes in which no infection atrium can be found. These cases should never be subjected to incisions unless suppuration has occurred. The same principle holds good in dealing with inflammatory conditions in the cavities of the body. Acute, diffuse, inflammatory conditions are not benefited by incisions. Operation should be deferred until nature has localized the process; then simple evacuation of the pus and drainage in the most dependent part is all that is necessary. In operating upon those acute cases in which collections of pus must be drained through healthy tissue care should be taken to prevent contamination of the incised healthy tissue with the pus. In all of these cases an incis-

ion should be made down to the abscess cavity, and before this is opened the incised healthy structures should be protected with a coating of vaseline, or, preferably, compound tincture of benzoin. If this simple precaution is observed healing will be very prompt and the suffering of the patient materially diminished. Tubular drainage should have the preference over all other forms in draining acute inflammatory conditions.

V. CHRONIC INFLAMMATIONS.

The indications in treating all chronic inflammations are drainage, followed by removal of all dead tissue. If an acute inflammatory process following an injury does not show a tendency to heal, there is reason to believe that drainage is not efficient or that dead tissue is responsible for the suppuration. In these cases all suppurative sinuses should be thoroughly explored and all necrosed or markedly degenerated tissue removed by excision, or by means of the curette. In mesoblastic tissues it is not essential that marked inflammatory tissue should be removed, or that in all cases necrosed tissue be dissected, in order to secure good results. Necrosed portions of bone, of course, present positive indications for removal, but it is probable that many times these liquefy and disappear spontaneously. Markedly degenerated, or even dead connective tissue will many times be digested and complete healing result without operative interference. The conditions are different, however, in dealing with chronic inflammatory diseases involving structures with an epithelial lining membrane. If complete destruction of the epithelial structure has not occurred as a result of the inflammatory process the remaining epithelial cells will continue to secrete, and recovery will not be complete unless continuous drainage is provided for. In operating upon chronic inflammatory conditions in these structures, the epithelial tissue must be removed, or there must be present a means of drainage, either into the ordinary channels of the body or by means of an artificial opening. Many secondary, and sometimes repeated, operations would be avoided if this advice were kept in mind.

In performing operations for chronic inflammatory conditions in the soft or bony structures it is not necessary that chemicals should be used to destroy the infection, nor is it necessary that irrigation be employed. The opinion is given that better results will be obtained if we operate dry in all of these cases. It is true that strong chemicals may occasionally do good in operating upon lesions of the bone, but as a rule their use, even in this class of cases, does not materially aid in obtaining rapid healing or more permanent results.

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VI. GANGRENE.

The indications for operative treatment in cases of gangrene are usually easily determined. Dead tissue should be removed for the reason that absorption of dead material injures the general condition of the patient, and a useful extremity is rarely obtained in cases of gangrene unless operative treatment is resorted to.

In deciding for or against operation in dealing with gangrene, it is generally wise to allow a decided line of demarcation to form, in all cases of dry gangrene, before operation. The reverse is usually true in cases of progressive or moist gangrene. It is seldom advisable, and many times impossible, to defer operative treatment in these cases with the hope that a line of demarcation may be formed.

TRAUMATIC GANGRENE.

The indications for amputation, in cases of traumatic gangrene, are well understood. The local findings usually suggest clearly the site at which the operation should be performed. In dealing with these cases delay is advisable if doubt exists regarding the viability of tissue.

INFLAMMATORY GANGRENE.

Gangrene dependent upon serious and progressive inflammatory conditions usually presents an immediate indication for the removal of gangrenous and markedly disorganized tissues. No delay is justifiable in caring for the most serious of these cases. Amputation should be done well above markedly diseased tissue.

SENILE GANGRENE.

Senile gangrene, in almost every case, presents an indication for amputation. Localized gangrenous areas occurring in old patients as a result of localized traumatism do not demand amputation of the extremity. All other forms of senile gangrene destroy the entire extremity, and consequently necessitate its removal. If a senile gangrene is of the dry variety and is not infected, as is very often the case, no amputation should be done until the line of demarcation has formed. When the gangrenous process has ceased to spread an amputation is then indicated either at the line of demarcation or sufficiently proximate to such point to secure a desirable stump.

If the gangrene is of the moist variety amputation should be done before the line of demarcation forms. If the condition involves the lower extremity, which is usually the location, an amputation should be done at the lower third of the thigh, in all cases in which the gangrene is of the soft variety. There are, no doubt, many who will object to this statement. Many operators of considerable experience would hesitate to advise a thigh amputation for a moist, senile gangrene not extending above the ankle. This subject seems to be unsettled at the present time; but some consider only a thigh amputation in treating any infected form of senile gangrene involving any portion of the lower extremity above the base of the toes.

In performing amputations on senile patients for gangrene of the lower extremity there are certain precautions that should be observed in every case. Spinal or local anesthesia should be the anesthesia of choice. No constrictor should be applied in performing the amputation and no sutures should be used to approximate the flaps. These measures can be carried out without difficulty and aid materially in securing an efficient blood supply to the operated tissues.

DIABETIC GANGRENE.

Diabetic gangrene resembles senile gangrene in that it occurs, as a rule, in aged patients, and is invariably associated, according to Haidenhain and others, with marked and advanced arterio-sclerotic changes. Diabetic gangrene that extends beyond the base of the toes appears to present a positive indication in all cases for a thigh amputation. If the gangrenous process is limited to the toes, and a line of demarcation seems about to form, no operation should be done until the progress of the disease can be determined. On the other hand if the process has extended to the dorsum, or to the sole, of the foot it can be expected to speedily progress, and will not be terminated by an amputation at or below the knee-joint. It is possible that amputations below the lower third of the thigh may occasionally be entirely sufficient to arrest the progress of the gangrene in some of these cases, but usually a thigh amputation will be essential to secure the best results. We are not justified in these progressive cases of diabetic gangrene in waiting for a line of demarcation to form. This is equally true of non-infected cases as it is of the moist variety.

The operation for the removal of the gangrenous extremity occurring in diabetics should be performed with the same precautions that

have been described in doing amputations for senile gangrene. The large arteries should not be subjected to the traumatism of a constrictor, and the circulation in the flaps should not be interfered with by the application of muscular or cutaneous sutures. It is unnecessary to state that these operations should be done rapidly, under the strictest aseptic precautions, and that the general condition of the patient and the anesthesia should receive the most careful attention.

GANGRENE RESULTING FROM FREEZING.

Primary amputation is never indicated in these cases. The removal of dead tissue should be deferred until a definite line of demarcation has been established. Of course, if a progressive and serious inflammatory condition complicates these cases, operation may be required after the primary damage to the tissues has occurred.

Amputation of the lower extremities for gangrene resulting from freezing may be done moderately early in the course of the process. This is not true when the hands have been frozen. Occasionally more of the hand tissue can be saved if the soft, gangrenous tissues are allowed to separate from the bones; and after this has taken place the bony projections are simply removed, allowing the soft tissues to grow in a pointed manner over the bony stumps. Early amputation of frozen fingers should be advised against, unless progressing complications demand prompt surgical treatment.

ERGOT GANGRENE.

Operative treatment should not be resorted to in dealing with cases of gangrene due to ergot poisoning. While the condition is progressing general and local measures should be resorted to with the idea of improving the general welfare of the patient before gangrenous tissue is removed. When the patient's general condition approaches the normal, and the local gangrenous processes have ceased to progress, the removal of dead tissue is indicated.

CUTANEOUS GANGRENE.

Operative treatment is rarely called for in dealing with gangrene of the skin. These cases usually result from erysipelas, or other inflammatory conditions, or from pressure associated with a diminished resistance of the tissues of the patient. As a rule spontaneous sloughing of dead tissue is preferable, in these cases, to surgical interference.

VII. BONES AND JOINTS.

In discussing the indications for operative treatment in affections of the bones and joints many conditions that are amenable to operation have been purposely omitted—such as definite, benign, osseous tumors—for the reason that the indications for treatment in these cases are well understood. Fractures of the spine and skull have been mentioned under the heading of the Nervous System for the reason that the involvement of nervous tissue, in these fractures, suggests the treatment.

In reviewing the surgery of the joints certain well-known surgical conditions, such as the presence of movable bodies in the joints, have not been dwelt upon. Some of the joint affections have been discussed in the chapter dealing with Deformities and Congenital Defects.

FRACTURES.

The indications for open operative treatment in fractures of the long bones, or of any bone, are difficult to determine. Not only do the opinions of various surgeons differ regarding the treatment that is best suited to the various fractures, but individual operators often make radical changes in their views touching this subject. For this reason, and on account of the fact that a study of the reported cases of fractures treated by the various methods does not strongly approve or condemn any method of treatment, I shall, in the presentation of this subject, state what appears to have the best weight of authority.

SUBCUTANEOUS FRACTURES.

As a rule direct fixation of subcutaneous fractures should be advised against. The operation is uncalled for in all but exceptional cases. The results following non-operative treatment are usually satisfactory, and the technic necessary for the direct fixation of a subcutaneous fracture is, by no means, without danger.

The responsibility attached to performing an open operation for a recent fracture cannot be overestimated. While the immediate results of the procedure do not threaten the life of the patient, the remote complications that too often follow these operations are most

serious indeed. Infection, which, at the present time cannot in all cases be prevented, almost without exception results in complications that necessitate, many times, the performance of multiple operations, a great loss of time to the patient and occasionally the loss of an extremity. It is true that many if not the majority of these operations are successful, but the bad results that are met with so often when a subcutaneous fracture has been exposed by incision are sufficient to warrant us in doing these operations only as an absolute necessity. Nothing can so effectually mar the career of a young and promising worker as the indiscriminate operating on a large number of subcutaneous fractures. If the significance of this treatment is not fully appreciated a bad result is sure to follow.

In fracture of the long bones operative treatment should not be resorted to unless it is impossible to reduce the fracture, or to keep it in fairly good position. We are justified, at the present time, in advising operation in cases of fracture in which it is impossible to reduce the same without exposing the fragments. Reduction will be found impossible in certain epiphyseal fractures, and in perhaps a small number of fractures of the shafts of bones. A fracture that can be reduced, but cannot be retained in position, presents an indication for operative treatment, if the general condition of the patient is not unfavorable to the doing of any operation.

If it has been decided to treat a fracture by direct fixation, operation should not be immediately performed if the injury to the tissues has been extensive and the extravasation of blood considerable. Operation is best pursued in these serious fractures after the tissues have reacted to the primary injury, and the extravasated blood, in part at least, has been absorbed. Many times a week of delay is time well spent by these patients.

The best methods of proceeding in these cases has not been generally agreed upon. In every instance possible it is, doubtless, better to make use of periosteal sutures of absorbable material in fixing the fragments. The drilling of the fragments is to be avoided whenever possible. The use of non-absorbable material has been largely discarded. Many operators are partial to silver wire in fixing bony fragments. The retention of the fragments is best accomplished by mechanical appliances, fitting accurately the surface of the part. Procedures for holding the bony surfaces together should never be wholly relied upon to overcome the displacement caused by faulty position of

the patient or muscular contractures. The clamp devised by Parkhill is very efficient in retaining bony fragments in position, but is especially liable to allow infection to occur. While fixation by the clamp method is perhaps more efficient than suturing, or nailing, it cannot be considered more satisfactory than other methods in dealing with these cases.

SPECIAL FRACTURES.

Fractures of the long bones of the extremities very seldom require open operative treatment. It is needful only when there is good reason to believe a considerable amount of soft tissue lies between the fragments and it is impossible, by manipulation, to bring the broken, bony surfaces in direct contact. The operation, in these cases, should aim principally to secure complete reduction of the fragments rather than their retention in position.

FRACTURES OF THE CLAVICLE.

Open operation should be advised in fractures of the clavicle in which it is impossible to retain the fragments in an approximately normal position.

OLECRANON.

Fractures of the olecranon process are best treated, in the majority of instances, by open operation. The fragments can usually be retained in position by periosteal suturing. A tenotomy of the triceps is unnecessary.

ACROMION.

Most cases of fracture of the acromion process of the scapula are best treated by primary, direct fixation of the fragments.

OS CALCIS.

Fractures of the posterior portion of the os calcis many times require operative interference to secure the best results. A tenotomy of the tendo Achilles will, in most instances, be sufficient to permit retention of the fragments in proper position. If it seems probable, after a tenotomy has been done, that reduction of the fracture cannot be maintained, direct fixation of the fragments is indicated.

PATELLA.

It is probable that operative treatment should be the treatment of choice in dealing with all but a few fractures of the patella. Sub-

cutaneous reduction is many times impossible in these cases. The non-operative treatment is prolonged, and often the results are unsatisfactory if the fracture is not exposed. If direct fixation is properly and aseptically done, the results are nearly perfect, and the patient can be out of bed in a very short time. The danger in these operations is from sepsis, and for this reason no operator who is uncertain of his technique should attempt the open treatment in dealing with fractures of the patella.

In performing these operations fixation of the fragments by suturing the soft structures with absorbable material is preferable to bony suturing, to the use of non-absorbable material, or the subcutaneous method of approximation and retention.

FRACTURE-DISLOCATION OF THE UPPER END OF THE HUMERUS.

Injuries resulting in a fracture of the anatomical or surgical neck of the humerus, with dislocation of the upper fragments, will, in perhaps two-thirds of the cases, require operative treatment to secure the best results. In dealing with these cases replacement by manipulation should be attempted under a general anesthetic before open incision is resorted to. If the contusion to the surrounding tissue has been marked, and the extravasation of blood has been extensive, operation should not be attempted until the local reaction following the injury has subsided. A delay of two weeks does not materially interfere with the ultimate results. According to the reports of Thanhayn and McBurney, perhaps one-third of these cases can be placed in a proper position by using external manipulation.

If it is found impossible to place the fragments in a proper position by manipulation, operation should be resorted to. In anterior dislocations an incision should be made in front, while in the posterior varieties a posterior incision will give a better exposure. The reports of Curtis, Berger, Triepier, Wolfier and others suggest that fixation of the fragments, followed by reduction, should be the operation most often performed. The site of the fracture does not modify the type of operation. It is true that better functional results follow replacement of the fragments when the line of fracture is in the region of the surgical neck of the bone than when the anatomical neck is the site of the break. Nevertheless, the fragments should be placed in position and the dislocation reduced regardless of the site of the

line of fracture. Resection of the upper fragment, practised by Delpech, Morton, Croft, Manclaire, may be expected to give fairly good results in these cases if the anatomical neck is fractured. This operation may be resorted to under certain conditions, but should never be done as the operation of choice at the primary treatment. The results following removal of the upper fragment are, as a rule, not as satisfactory as those obtained by replacement of the fragments.

The method of treating these cases that produces a union of the fragments before the dislocation is reduced, should be advised against. The results following this procedure are so unsatisfactory, and serious complications resulting from cicatricial formations are so likely to occur that we should discourage this method of treatment in every instance.

The same is true of the treatment of these cases with the idea of producing a false joint. Ribberi treated one case by this method, but the result was unsatisfactory. It is probable that early manipulation, with the hope of securing a false joint, is not indicated in these cases.

While the result by open arthrotomy cannot be said to be perfect in all cases of fracture-dislocation of the humerus, it is probable that this is the best method of treatment at the present time, and that while occasionally it may be necessary to remove the upper fragment, as a rule the best result will be obtained by placing the fragments in position, reducing the dislocation and instituting early passive movements. All of these cases should be treated by this method as soon as it can be determined that replacement by manipulation cannot be accomplished.

FRACTURE OF THE NECK OF THE FEMUR.

It is generally agreed that no primary operation should be performed in any case of fracture of the neck of the femur. While it is true that the results following mechanical treatment will many times be unsatisfactory, and occasionally surgical treatment will be indicated, the dangers of the operation, the condition of the patient, and the osteoporotic nature of the bone at the seat of the fracture are sufficient to contraindicate operation as a primary treatment in any of these cases. Although Langenbeck operated upon an ununited fracture of the hip as early as 1858, and since that time these


operations have been reported with more or less success, and in spite of the fact that many observers have done extensive experimental work along this line, the question of operative interference in cases of ununited fractures of the hip remains a disputed one. The results of fourteen operated cases that can be collected from the literature do not convince us that operation is or is not the best treatment. At the present time the opinion is that operation should not be done in any ununited fracture of the hip unless the loss of function is great or the suffering severe.

All of these operations are serious in character, the patient is usually in bad condition, well advanced in years, and infection is likely to occur. Another fact that must be taken into account is that the head of the bone has a poor blood supply, that osteoporosis is commonly met with in these patients, and that it is doubtless true that occasionally these fractures refuse to unite under all conditions.

If it has been decided to perform an operation on a patient who is suffering from a fracture of the neck of the femur, the method of choice will depend upon the conditions that are found when the fracture is exposed. If there is reason to believe, from the condition of the bone and the appearance of the proximal fragment, that bony union is not likely to take place, resection of the head of the bone should be the operation to be done. On the other hand, if the broken fragments seem to have a considerable amount of vitality and show a tendency to callous formation, freshening of the fractured surfaces and approximation of the fragments should be tried. The Parkhill clamp, or a non-metallic nail, may be used to hold the fragments in position.

The reported cases do not give us any idea which operation should be performed in the majority of cases, neither are we able to determine at the present time that resection of the head of the bone will be followed by as good functional results as replacement of the fragments.

At present operation in cases of ununited fracture of the femur should be limited to those patients with poor functional results, with considerable pain in the joint, and especially to those in which the physical condition is sufficiently good to withstand the performance of a major operation.



COMPOUND FRACTURES.

The indications for operation in the treatment of compound fractures of the long bones differ from those of subcutaneous fractures, for the reason that infection is likely to be present. All direct compound fractures must be considered and treated as infected wounds. Most writers state that all compound fractures must be looked upon as infected, and treated accordingly. While this advice holds good as a rule, it is not true of certain compound fractures resulting from indirect violence. An injury that has resulted in a compound fracture in which the bones have been forced through the skin by indirect violence, rarely offers a chance for infection of the deep portions of the wound. Many times attempts to render these non-infected wounds aseptic have resulted in delaying the process of repair, and sometimes in infecting an otherwise clean injury.

The advisability of amputation must be considered in all serious compound fractures of the extremities. The indications for or against amputation depend, first, on the blood supply of the distal portion of the extremity, and the amount of injury that the skin has sustained in the region of the fracture. If there is reason to believe from examination of the wound, or from the circulation below the injury, that anemic necrosis will follow, amputation is indicated. Complete destruction of the current in the brachial or femoral arteries usually suggests amputation. If the corresponding veins are also destroyed, amputation will be indicated in all but exceptional cases. Extensive skin injuries, associated with an adequate circulation in the limb distal to the fracture, rarely require amputation. If it is impossible to determine that amputation is or is not indicated, the limb should not be removed. If there is doubt regarding the injury to the intima of a large artery, the existence of a bruit over the vessel at the site of suspected injury, associated with a diminished circulation in the vessel distal to the injury, indicates that the intima of the artery has been injured, and that thrombosis may be expected to follow. These findings do not positively indicate amputation. While it is true that the main vessel will become occluded, the formation of the thrombus may be sufficiently delayed to allow the collateral circulation to compensate, at least in part, for the gradual occlusion of the main arterial trunk.

The prevention and elimination of infection are the most important principles in treating compound fractures that do not re-

quire amputation. If the injury has resulted from direct violence, thorough exposure of the wound is indicated. All parts of the wound should be inspected and thoroughly cleansed.

While mechanical means must be relied upon, in a great measure, to prevent and eliminate infection in these cases, there are many who believe in the efficiency of chemicals to destroy and prevent the development of bacteria. The tincture of iodine has been used for this purpose, and while the results were satisfactory they were no better than where mechanical measures alone were relied upon.

In cleansing the wounds, in cases of compound fracture, all soft tissues that appear to be thoroughly impregnated with foreign material should be well dissected; detached, or partially detached, bony fragments should be removed; or, if there is reason to believe, on account of the size and importance of the fragments, that their presence would aid materially in securing a better result, they may be re-implanted. If infection does not occur they will unite, even if their detachment has been complete.

In the primary treatment of compound fractures injuries to important nerves must be kept in mind; and if essential nerve trunks have been divided their ends should be approximated by suturing.

Direct fixation of the bony fragments, in cases of compound fracture, is insisted upon by many but is being discarded by some. One is apt to change an opinion for, or against, fixation of the fragments, depending upon the class of cases he has most often treated and the results obtained. At the present time it is regarded good practice not to resort to fixation of the fragments unless there is good reason to believe that the fragments cannot be held in position by external appliances. If it is thought necessary to directly fix the fragments, suturing with catgut should be considered more desirable than the drilling of fragments or the use of non-absorbable material. The various metallic, bone, and ivory mechanical devices that have been recommended and used to retain bony fragments in position are seldom, if ever, now indicated.

The skin wound should never be completely closed in any case of compound fracture. Absorbent dressings should be applied to those wounds that are easily approximated. Suturing of the wound should never be resorted to when a portion of the skin has been destroyed, or when approximation of the wound produces tension.

In certain selected cases it is desirable to close the wound by

suturing the fibrous and muscular tissues. This method is indicated when the superficial injury is extensive, while the deep structures show little evidences of marked contusion or laceration. The object in closing the fracture in this manner is to prevent infection from the superficial structures from attacking the bone.

Primary drainage is indicated in the treatment of all compound fractures. The extent of the drainage depends upon the character of the infection and the extensiveness of the laceration. Counter openings should be made when necessary to prevent the formation of so-called dead spaces.

INDIRECT COMPOUND FRACTURES OF THE EXTREMITIES.

It seldom occurs that a compound fracture wound is infected if the force that has resulted in the production of the fracture has not been applied to the skin wound. In such a case, superficial cleansing of the wound and of the protruding fragments is all that is necessary. It is preferable to the complete exposure of the fracture and extensive exploration of the wound. This method of treatment, it must be remembered, is indicated only in a small number of cases. If there is reason to believe that infection might be present in the deeper parts of the wound, the more radical primary cleansing is demanded.

GUNSHOT FRACTURES.

Gunshot fractures of the long bones never present an indication for exploration, or for irrigation. If the skin wounds are small, and important vessels and nerves have not been injured, the application of an aseptic dressing is all that is called for. If a gunshot wound of an extremity produces an extensive open injury of the soft and bony structures, the treatment that has been described for compound fractures due to other causes may be employed.

COMPLICATIONS OF COMPOUND FRACTURES.

Gangrene occurring as a complication of a fracture of course indicates amputation.

Infection is the most serious, as well as the most common, complication of compound fractures. This occurrence, recognized by general and local symptoms and findings, presents an immediate indication for direct treatment of the wound. Sutures should be removed and efficient drainage, both of the site of the primary wound

and in the most dependent part of the infected area, should be provided for. Through-and-through tubular drainage is always advisable if the infection is a virulent one, or involves a large area. The opinion is ventured that irrigation with sterile or antiseptic solutions does no good in most of these cases, and occasionally carries infection to non-infected parts of the wound.

The development of osteomyelitis following compound fracture presents an indication for drainage only. No inflamed or dead osseous or soft tissues should be removed until the acute stages of the infection have passed. Operation on the infected bone should be undertaken only when the inflammatory conditions in the soft tissues have practically resolved and there is reason to believe that the suppurative process is confined to the bone. When this stage has arrived open operation may be undertaken to remove dead bone, to terminate the infective process, and to place the fragments in a position that will admit of bony union.

NON-UNION OF FRACTURES.

There is a class of cases in which a fracture refuses to unite, apparently on account of a callus refusing to form. These cases are rarely met with. Reduction may be perfect, and the possibility of soft tissues existing between the fragments can be practically excluded.

While operation may be indicated in some of these cases, the general condition of the patient must be carefully studied to determine, if possible, the cause of the absence of callus formation. Syphilis, and other diseases and general conditions must be carefully considered before operative treatment is advised. The internal administration of various remedies, particularly thyroid extract, should be given a trial before operation is resorted to. Local, passive congestion, ambulatory treatment, and irritation of the fragments by manipulation should be tried before a direct method of treatment is advised.

If all non-operative measures fail to benefit the fracture, drilling of the fragments should be done. If repeated drillings seem useless, exposure of the fragments, followed by vivifying of the broken surfaces and retaining of the fragments in proper position, is indicated. Repeated operations are sometimes necessary to secure bony union, and occasionally all methods fail.

In the great majority of cases of delayed union and pseudoarthrosis the fragments have not been properly reduced, and normal or abnormal soft tissues separate the broken ends. An attempt at callus formation can be readily made out from examining the fragments. These cases can, as a rule, be treated successfully by open operation.

If the displacement is not marked and the fracture not of long standing, reduction by manipulation, with the patient anesthetized, should be given a trial. This method will succeed in properly selected cases.

If the deformity is marked and the fragments freely movable, open operation is positively indicated.

The operation in these cases should accomplish direct apposition of the bony fragments. The fibrous tissue covering the broken surfaces should be removed by using chisels or a saw. An oblique, bony surface should be obtained when possible, as this offers a broad area for union. If possible, the fractured surfaces should be so shaped as to mechanically prevent displacement. Drilling of the fragments, or the use of foreign material to retain reduction, should be avoided, if possible. All periosteum that can be saved should be allowed to overlap the fracture. Non-absorbable material should not be used in operating upon these cases. Drainage for twenty-four hours is advisable in all of these operations.

In operating upon these cases injury to the bony and soft structures should be avoided as far as possible. Occasionally it will not be found necessary to turn the fragments out of the wound in order to deal with the ends of the bones satisfactorily. Undue exposure of the bony structures, and removal of the soft structures from the fragments, should be guarded against as much as possible.

VICIOUS UNION OF FRACTURES.

Operation is indicated in cases of vicious union following fractures if the deformity is great, and the function markedly interfered with.

Open operation should be the method of choice. A linear osteotomy, followed by a retention of the fragments in a slightly over-corrected position, will be entirely sufficient. A wedge-shaped osteotomy is indicated only when the deformity is very angular, or when the fracture has occurred close to a joint.

Subcutaneous osteoclasia cannot be depended upon to give as satisfactory a result in cases of vicious union as the open operation.

ACUTE OSTEOMYELITIS.

The treatment of acute osteomyelitis is surgical. Early operation is positively indicated in all of these cases. The operation should consist of drainage only. Incision should be made down to the disease focus. It is not necessary that dead or inflamed osseous tissue should be removed at the primary operation. In fact, it is better that extensive removal of osseous tissue should not be done in the acute stages of the disease. It is rarely possible to eradicate the infection in the acute stages, and often the inflammatory process is intensified, rather than diminished, by extensive primary operations.

Periosteal incision over the osteomyelitic focus, recommended and practised by some as the operation of choice in acute osteomyelitis, has a limited field of usefulness. The drainage, in the acute cases, should extend to the infective process. It must be remembered that occasionally an acute osteomyelitis has its starting point close to the periosteum. In these cases periosteal incision will meet the indications at the primary treatment. It is also true that a sub-periosteal abscess may complicate an acute osteomyelitis, without the presence of a direct communication with the bone marrow. If a sub-periosteal abscess is encountered in operating for acute osteomyelitis, the operation should be extended into the bone, if the osseous tissue under the abscess seems markedly involved in an inflammatory process. Irrigation or the use of chemical antiseptics are of little value in osteomyelitis in its acute stages.

When acute osteomyelitis is treated by drainage only, secondary operative procedures will, as a rule, be necessary before the disease is eradicated. This objection does not indicate the performance of extensive primary operations for acute cases of osteomyelitis.

CHRONIC OSTEOMYELITIS.

The treatment of this disease is surgical. The operation should have for its objects the removal of dead and infected tissue, and the obliteration of the bony cavity.

Osteomyelitic cavities may be obliterated by so exposing the bony structure as to allow the soft tissues to fill the cavity; by packing the cavity with gauze; or by filling the bony defect with foreign

material. The indications for these methods will depend upon the character of the case, and, to a great extent, on the experience of the operator. All of them are sometimes successful, and all of them occasionally seem unsatisfactory. If there is reason to believe that suppuration will follow the operation, packing and drainage should be done. The method recommended by Mosetig-Moorhof has given satisfactory results in many of these cases. In this method the bony cavity, after the hemorrhage has been controlled, is filled with a mixture containing sixty parts of iodoform, forty parts of spermaceti, and forty parts of sesame oil. The wound is then closed without drainage.

All operations for the relief of chronic osteomyelitis depend in a great measure for their success on the thoroughness of the removal of dead and infected tissues. Secondary operations will be required in most instances if diseased bony tissue remains after the operation has been performed.

POTT'S DISEASE.

At the present time it is impossible to say with any degree of positiveness that surgery is or is not indicated in any form of Pott's disease of the spine, or that it is the best treatment, as a routine, for any of the complications of this disease. The reported cases show that many good results have followed operative treatment, but show also that many failures may be expected. The reports impress us, however, that operations for tuberculosis of the spine are serious in character. One hundred and fifty-four cases operated upon showed a mortality of 16.45 per cent.; the recoveries in these cases amounted to 28 per cent. On account of the extensiveness of tuberculosis of the spine, on account of the fact that the disease in most instances originates and is most pronounced in the structures that lie in front of the spinal canal, and on account of the fact that in many of these serious cases other foci of tuberculosis exist in the body, we should select carefully the cases for operative treatment. Indiscriminate operation for Pott's disease, or for any of its complications, should be advised against in the strongest terms.

Operations attacking the bony structures of the spinal column in cases of tuberculous disease are rarely, if ever, indicated, unless the process is primary in the dorsal arches and is limited to this region. Then operation may be undertaken with the idea of eradicating the

focus of the disease. But if the disease is limited to the bodies of the vertebræ, as is so often the case, it seems that operation would rarely, if ever, be indicated, with the hope that the disease may be attacked and the patient permanently benefited. If an operation is done for a large collection of pus that has resulted from the disease originating in the body of the vertebra, and it is found at the time such operation is performed that some of the diseased osseous tissue can be safely removed, there is probably no contraindication to scraping out of the diseased bony structures. However, this should not be undertaken in any case in which the patient's condition is serious, or in which the removal of the diseased bony tissue would unnecessarily prolong the operation, or be attended with immediate risk.

Operative treatment is indicated in the majority of cases of Pott's disease complicated with large abscesses. The operation is indicated in these cases to remove the tuberculous material, which would lessen the toxemia: to prevent the mechanical pressure of the abscess cavity from interfering with the functions of the body: and in some instances to prevent spontaneous rupture. In cases of cervical tuberculous disease of the spine retro-pharyngeal collections of pus should be aspirated or drained before spontaneous rupture occurs. If these cases are drained into the pharyngeal cavity mixed infection invariably follows. Abscesses, following tuberculous disease in the lower regions of the spine present an indication for aspiration in all cases in which the situation of the abscess is such that its contents can be removed safely with an aspirating needle. If it is thought advisable to drain these cavities by direct incision an anterior, or a posterior, incision should be made, the contents of the cavity evacuated and the wound allowed to heal without drainage. No drainage tube or gauze should ever be inserted into these abscess cavities; if this is done secondary infection will occur in almost every instance. At the time these cavities are opened it is well to explore them and to remove masses of tuberculous tissue that may be found adherent to their linings. Little is to be gained by curetting these cavities or by washing them out. If there is reason to believe, from the history of the case and the extensiveness of the disease, that continuous drainage of the abscess cavity is desirable, spontaneous rupture is preferable to open incision. It is probable that secondary infection is less likely to follow in cases in which the rupture of the abscess has occurred spontaneously than it is when incision has been made into the abscess.

cavity. Spontaneous openings drain efficiently, as they usually occur in the most dependent part of the cavity. Many believe that spontaneous rupture is preferable in all instances to incision or evacuation by aspiration. Many times benefit can be done to these patients by removing the tuberculous material in these abscesses by incision, followed by prompt closure of the opening, therefore we are not justified in some cases in waiting for spontaneous opening of these abscesses to occur. This is especially true of psoas abscesses that become superficial in the lumbar region, or that point above Poupart's ligament.

Surgical treatment is probably indicated in all cases of tuberculous spondylitis to relieve cord symptoms that occur suddenly, or that are due to pressure of tuberculous material. It will rarely happen that involvement of the cord will be found to be due to bony pressure. It has been shown that in the great majority of these cases tuberculous disease of the soft structures is responsible for the pressure symptoms. Operation will probably do good in the majority of these, if it is not delayed until a progressive ascending myelitis has developed. If this condition is present of course no operation should be recommended. If there is reason to believe that the paralytic symptoms have resulted from the rupture of an abscess operation should be done at once. Of course, operation should not be undertaken for subacute and chronic involvements of the cord until extension and other palliative measures have been given a very thorough trial. If these fail and the symptoms remain the same or are progressing, operation in all probability offers the only hope of relief.

Operative treatment is rarely if ever indicated to correct bony deformities of the spine. If the tuberculous process has not healed, non-operative measures will probably be more successful than will the open treatment. If the spine has become ankylosed there rarely is presented an indication for operation. On account of injury to the cord we are not justified in subjecting these patients to surgical treatment for the relief of deformity alone. Forceful correction of deformity, that has been practised to a considerable extent during the last few years, is believed unwarrantable by many. Although the reports of the operated cases show that sometimes this procedure is successful it is probable that the operation will be performed less extensively in the future than it has been in the past, and that in a few years it will rarely if ever be advised. It is by no means free

from danger and the results obtained, including the reduction of the deformity, are not sufficient to compensate for the risk of injuring the cord or of rekindling the tuberculous process.

In all operations on the spinal column for the relief of tuberculous disease the region of the spine involved does not materially affect the indications for treatment. It has been shown that operations in the cervical region are more serious from the standpoint of immediate fatality, but the results obtained in this portion of the spine do not differ materially from those obtained when operations are done in the dorsal or lumbar regions. The reports of Lloyd seem to show that the results from operative procedures in the cervical region are better than are those in the dorsal. The presence of the vertebral arteries renders operations in the upper regions of the spine dangerous from the standpoint of hemorrhage.

SYPHILIS OF THE BONES.

Involvement of the periosteum or bone in syphilitic processes requires surgical treatment when enlargements mechanically inconvenience the patient, or when the syphilitic process has resulted in the production of dead material. Avascular syphilitic tissue, or tissue that has necrosed as a result of anemia from syphilitic processes, should be removed by operation. Internal medication cannot affect syphilitic bone sequestra, or broken down and necrosed osseous or periosteal syphilitic growths. The operation in these cases should remove all dead tissue, and should provide against mixed infection. Drainage is not necessary, neither is it essential that vascular syphilitic tissue be removed. The presence of a mixed infection, of course, previous to the performance of such operations, modifies the technique, in that drainage should be provided for.

TUBERCULOSIS OF THE RIBS.

Rib tuberculosis is usually primarily a periostitis. These cases present indications for surgical treatment when not associated with extensive tuberculous changes in other portions of the body; when the rib affection seems to be progressing in severity; or when secondary infection has occurred. The aspiration of abscesses resulting from tuberculosis of the ribs has not generally secured desirable results. Incision and drainage should be advised against. Secondary infection follows this treatment and the process is not terminated. The

best treatment is exposure of the diseased area, followed by the complete removal of all diseased or suspicious structures; the application of iodine, or other chemicals, to the operated surface; and complete closure of the wound.

SARCOMA OF THE BONES.

Sarcomas involving the bones of the skull are usually very malignant in character, and while they can be treated successfully only by radical removal are usually unsatisfactory conditions to care for. Most of these growths develop rapidly, have an extensive blood supply and materially affect the general condition of the patient. The operation for their removal is serious in character, and recurrence is common. It is probable that while operative treatment offers the only chance of permanently curing these patients, most of them succumb if a rapidly-growing sarcoma develops in the bones of the skull.

The rapidly-growing, soft, round-celled sarcomas attacking the long bones are very serious, if not fatal, conditions. Amputation high above the seat of the growths is positively indicated in the early stages, but in most instances this does not eradicate the disease. It is true that local recurrence is uncommon after this operation has been performed, but secondary growths often develop in distant portions of the body, and speedily terminate the life of the patient. For this reason, while we are justified in advising high amputation we cannot expect to secure a permanent good result unless the operation has been performed at the very beginning of the disease.

The foregoing statements are not true in all varieties of sarcoma involving the long bones. The periosteal, hard, slow-growing sarcomata can be treated successfully by operative measures in most instances. An amputation well above the location of the tumor will secure a permanent good result in most instances. Histologically these growths are spindle-celled, do not contain a large supply of blood, are well encapsulated and contain a large amount of connective tissue. These growths present positive indications for operation and can be treated successfully in the great majority of instances.

MEDULLARY SARCOMAS.

Tumors developing from the marrow of the bone may be of high or low malignancy. When the clinical course has been rapid, the tumor progressing rapidly in size, and the effect on the patient's gen-

eral condition serious, little can be expected by performing a radical operation. On the other hand, if the tumor has been of long standing and has not materially lowered the patient's resistance or vitality, radical removal will, as a rule, secure permanent relief. These growths rarely invade the proximal joint, and for this reason disarticulation of the joint next to the tumor is as efficient as is amputation higher up. Owing to the fact that most of the tumors are found in the femur or in the humerus the fact that the joint surfaces are rarely involved does not enable us to diminish the severity of the operation that is required to relieve them.

There are certain benign cystic growths involving the bones that, while they are mesoblastic in structure, are not of a malignant nature. These growths are cystic in character, usually of slow growth and rarely produce a marked effect on the patient. As a rule these growths are encapsulated and rarely recur if they are thoroughly removed. These cases present positive indications for surgical treatment but rarely require amputation. It has been shown by Bloodgood and others that many times curetting is sufficient to cure these patients. Excision of the growth should be the operation of choice. Resection should be done in preference to amputation in all cases unless an amputation will produce a more serviceable stump than will an extensive resection. In all varieties of bony tumors these benign, mesoblastic, cystic growths should be kept in mind. They are not extremely uncommon, they are not malignant, they rarely recur and should never be treated by amputation unless their location and size destroy the joint. The work of Von Mikulicz, Wesinger, Morton, Karewski, Hinds, Bloodgood and others, has shown conclusively that this variety of tumor can be treated successfully by simple removal, or by resection.

SARCOMA OF THE JAWS.

Sarcomas involving the upper or the lower jaw are not uncommon in occurrence and present positive indications for operative treatment. Occasionally a very malignant growth is formed in this location, but as a rule these tumors are slow-growing in character and do not speedily terminate the life of the patient. If there is reason to believe, from examination of the tumor, the condition of the patient and the history of the development of the growth, that the tumor is a malignant one, extensive resection should be done without delay.

Occasionally these cases may be permanently relieved but recurrence may be expected in most instances.

Many times mesoblastic semi-malignant growths occur in the jaws. The dentigerous cysts of the older writers, the medullary giant-celled sarcoma, the periosteal fibro-sarcoma, the myxochondro-sarcoma and the cystic-adamantine epithelioma are not infrequently found in the region of the jaw and can be treated successfully by resection. Extensive mutilating operations are not necessary to secure permanent results in dealing with these tumors. Care should be taken in advising treatment in any mesoblastic growth of the jaw to determine the relative malignancy of the tumor. If the growth is not extremely malignant it is best treated by complete removal and not by extensive mutilating operations. It has been shown conclusively that we are not endangering the life of the patient by subjecting these semi-malignant and benign osseous growths to simple resection.

INJURIES OF THE JOINTS.

Subcutaneous injuries involving the soft or bony structures of a joint should never be subjected to operative treatment at the time the injury occurs. If, from the extent of the injury, there is reason to believe that an operation will be necessary to secure the best results, a delay of one week to ten days should precede the open treatment. These injuries should never be subjected to open incision until the reaction to the injury has subsided and the extravasated blood has been removed by absorption. The danger attached to operations in these cases at the primary dressing is infection. It must be admitted that it is entirely possible and probable that such operations can be performed and no infection follow. The results, however, are equally good if the operative treatment has been delayed, and the chances of infection are reduced to a minimum if operation is not done until the injured tissues have recovered from the effects of the traumatism.

COMPOUND CRUSHING INJURIES OF THE JOINTS.

Operative measures at the primary treatment are positively indicated in all compound crushing injuries involving the joints. There are two indications to be met in treating these cases: Infection must be removed and prevented, as far as possible, and many times assist-

ance in the repair of the tissues is essential. If the opening in the skin is small, and from the appearance of the wound and the history of the injury there is reason to believe that little infectious material has been implanted into the deep structures of the joint, the primary treatment should consist only of cleansing the superficial structures and drainage. Complete suturing of the skin wound should not be attempted. If, on the other hand, the skin wound is extensive and the entire joint surface has been freely exposed, the cleansing of the injured part should extend into the remotest part of the wound and throughout the entire joint cavity. Detached fragments of bone should be replaced, and in all cases the joint capsule should be closed by suturing. Superficial structures should be drained by leaving the external wound open. In no instance should a communication be left between the joint cavity and the superficial injured structures. In some of these serious cases the skin and subcutaneous tissue may suppurate; still the bony structures of the joint and the joint cavity will remain clean if the primary disinfection has been thorough. If the joint capsule is left open and a communication exists between the joint cavity and the skin, in the great majority of instances the superficial infection will find its way into the deeper structures and produce the well known, serious and long-standing consequences. A typical primary resection should never be undertaken as a first treatment for a crushing injury of the joint. In the great majority of these instances atypical resection will be entirely sufficient to obtain a useful extremity. Typical resections are only indicated in those cases when infection or other complications have completely destroyed both articular surfaces of the injured joint. If the injury has been so extensive that a resection is imperative amputation will, in the majority of instances, give a better extremity than will operations that have for their object an attempt to save a limb the principal joint of which must be entirely sacrificed.

GUNSHOT WOUNDS OF THE JOINTS.

The primary treatment of gunshot wounds of the joints has been revolutionized during the last few years. If the injury is so extensive that the vitality of the limb has been destroyed, and there is present no possibility of re-establishing the circulation by doing plastic work upon the large vessels, amputation should be done. If the injury to the bony structure of the joint has been extensive, but the

skin wounds are small and there is reason to believe from the character of the injury that extensive amounts of foreign material have not been carried into the joint, the primary treatment should consist only of cleansing the superficial wounds, the application of moist aseptic dressings and immobilization of the injured parts. If a suppuration, or other serious infection, occurs it is best treated by secondary operative measures. Extensive primary operations in these cases should never be undertaken. If a gunshot injury of the joint is associated with extensive destruction of the skin, or with large wounds of entrance and exit, the primary operative treatment must be extensive enough to thoroughly cleanse the injured tissue. These cases should be treated in the same manner that has been advised in compound crushing injuries of the joint. A primary resection should never be undertaken, and drainage of the deep structures to the skin should be avoided. Although it is true that when these so-called conservative methods are practised in primarily treating gunshot injuries of the joint, secondary operations will occasionally be required: yet the results are much more satisfactory than they have been shown to be when extensive operations have been done at the time the injury was received. Many of these cases remain clean from the start. This is specially true when the skin wounds are not large, and when the injured joint has not been interfered with by the surgeon.

Stab wounds of the joints present the same indications for treatment that have been discussed in crushing injuries of the joints in which the skin wounds are small.

CRUSHING INJURIES AND GUNSHOT WOUNDS OF INTERPHALANGEAL JOINTS.

When this class of injuries involves the toes, amputation should be the treatment of choice. There is little to be gained in endeavoring to save a toe that has been mangled and rendered useless. It is quite different with a hand. A finger should be amputated on account of an injury to a joint only when the circulation has been completely destroyed. A typical resection of a finger joint usually gives no better result than does amputation. If both joint surfaces have been extensively injured a typical resection may be considered: usually it is unadvisable. If only one articular surface has been destroyed, while the other is practically intact, a movable joint can be obtained in many instances if the wound is thoroughly cleaned. The

injured phalanx should be so shaped as to fit the remaining articular surface. If the joint remains clean, a useful digit will many times follow this injury. (In the *New York Medical Journal*, of July, 1904, I reported five cases of this character in which a useful and movable joint was obtained in each. In these patients one articular surface was resected, while the other was not involved in the injury.) I am of the opinion that we should never sacrifice a finger if one articular surface of the joint is not completely destroyed and the vitality of the finger seems sufficient to prevent necrosis.

POSTERIOR DISLOCATIONS OF THE HEAD OF THE TIBIA.

Primary operative interference is never indicated in posterior dislocations of the head of the tibia. Serious complications occur in many of these cases that require operation. (In the *Annals of Surgery*, for January, 1903, I was able to collect forty-eight reported cases of posterior dislocation of the head of the tibia, and also added four cases to this list. These reports show that thrombosis of the popliteal artery, resulting in gangrene of the leg in from forty-eight to seventy-two hours, occurred in twenty-five per cent. of these injuries. On account of the frequency of this complication the occurrence of gangrene following this accident must not be overlooked, and, while this is a rare injury, it is probable that an extremity must be sacrificed in twenty-five per cent. of the cases. Of course, the indications for amputation are not immediately manifest from the local condition, but it is important that the arterial complications should not be overlooked.) A guarded prognosis should always be made in any posterior dislocation of the tibial head. When amputation is required for gangrene following these injuries, a disarticulation at the knee-joint will rarely be sufficient, and thigh amputation has been necessary in treating most cases that have resulted in gangrene of the leg.

HABITUAL LUXATION OF THE PATELLA.

Operative treatment should be advised in all serious and long-standing cases of habitual luxation of the patella that resist mechanical appliances and that seriously inconvenience the patient. The operations for the relief of this condition are not serious in character, and if properly performed are productive of good results in the great majority of instances.

If it has been decided to perform an operation for the relief of habitual luxation of the patella, the procedure should hold the bone in place by plastic work upon the capsule and ligaments of the joint. The operation practised by Krugins, and described by him in the *Centralblatt für Chirurgie*, No. 9, 1904, will in all probability, meet the indications in most instances. Krugins raised a longitudinal bridge of tissue over the joint capsule on the inner side of the patella, leaving the bridge of tissue attached at its upper end; he then closed the longitudinal defect with a catgut suture, and sutured the lower portion of the elevated bridge of tissue to the outer side of the patella. This procedure narrows the capsule of the joint on the inner side of the patella and firmly connects the outer portion of this bone with that part of the capsule that has been operated upon. Most of these operations that can be depended upon to give permanent and complete relief, invade the cavity of the knee-joint. For this reason they should not be lightly undertaken, but should be performed with the greatest care. Asepsis is imperative, not only to secure a good result, but to preserve the function of the knee-joint.

DISLOCATION OF THE OUTER END OF THE CLAVICLE.

The indications for surgical treatment in this injury depend entirely upon the extensiveness of the damage to certain ligaments.

Dislocations of the outer end of the clavicle, without complete rupture of the coraco-clavicular ligaments, can be treated successfully without operative intervention.

Dislocations of the outer end of the clavicle, with complete rupture of the coraco-clavicular ligaments, require operative procedures to secure satisfactory results.

By physical examination we can distinguish these two classes clinically.

There are many examples of dislocations of the outer end of the clavicle treated successfully without operation. From the symptoms of such cases it is probable that the coraco-clavicular ligaments remained intact. I can find no report of a case presenting symptoms of dislocation of the outer end of the clavicle without complete rupture of the coraco-clavicular ligaments that was not treated successfully without operative interference. Thirty-six such cases have been recorded.

It is hard to prove that dislocations of the outer end of the

injured phalanx should be so shaped surface. If the joint remains clean follow this injury. (In the *New York* I reported five cases of this character joint was obtained in each. In the was resected, while the other was not the opinion that we should never surface of the joint is not completely finger seems sufficient to prevent

POSTERIOR DISLOCATIONS OF

Primary operative interference dislocations of the head of the tibia many of these cases that require *geru*, for January, 1903, I was cases of posterior dislocation of four cases to this list. These to popliteal artery, resulting in gang to seventy two hours, occurred juries. On account of the frequency of gangrene following this while this is a rare injury, it sacrificed in twenty-five per cent cations for amputation are no condition, but it is important not be overlooked. A guard any posterior dislocation of the after gangrene following knee will rarely be sufficient to prevent most

CLAVICULAR LUX

Clavicular luxations should be treated as follows: If the luxation is complete and that is the case, the treatment is to be given. If the luxation is incomplete, the treatment is to be given. If the luxation is complete, the treatment is to be given. If the luxation is incomplete, the treatment is to be given.

clavicular ligaments, results. There are rupture of the coraco- in which the results

deformity could unsatisfactory. New- given, as the patient

This suggests that a case of complete states that four weeks the arm. Dr. Albers operation, and states was deformity and con- reports two cases with poor is not give a fair test of reports a complete case es us no information; the

section of the outer end of complete rupture of the without operation and a

result in one out of nine section of the outer end of the complete rupture of the coraco-clavicular ligaments will rarely give satisfaction in these cases has been reported and no failures. said cases demonstrate the ad- which we might expect doubtful and the results may be termed the coraco-clavicular ligaments was reported, with symptoms coraco-clavicular ligaments, that of Lafon recognized that deficient. He states that the failed to give good retention of Dr. Albers had some un-

in treating dislocations of the outer end of the clavicle by operative methods. In a paper published in 1894 he states that he has had no experience with the operative treatment. He speaks of the difficulties met with in handling some cases. Most surgeons pass rapidly over the subject of these dislocations, giving one the impression that they have not much faith in the operative methods. He favors operative treatment. Budinger states that the results in these cases are in many instances bad. He is against operative treatment, and is of the opinion that, even if a better apparatus can be found that would hold the parts in position, there is always danger of gangrene or decubitus ensuing.

Though most writers who have studied the subject favor operative treatment, many cases are reported with good results obtained by non-operative treatment. However, most of these reports are of single cases. In only one have we reason to believe that the coraco-clavicular ligaments were completely ruptured; and many times the cases were reported to demonstrate a dressing or apparatus supposed to be especially effective in treating this form of dislocation. With regard to the more severe cases there are a few statements quoted without references, that are of more or less interest. Illoff says that most complete cases recover without marked disturbance of function, although with more or less deformity. Discher, König, and Tillmanns state that, even when marked displacement results, function may be perfect. Von Bergman and von Volkman say that they have never observed any disturbance except deformity to follow this dislocation. Defranceschi saw in three cases complete restoration of function despite the deformity. Bardenheuer, on the other hand, has seen marked disturbance of function in a case treated with care and thoroughness; and Hamilton saw two cases in which the disturbance of function was so marked that the patients could not raise their arms from their sides. The diversity of opinion that has existed in regard to treatment strengthens the arguments that I have been supporting. If the indication for operative treatment depends on the extent of the injury, a pathologic diagnosis must be made before the proper treatment can be advised. If a pathologic diagnosis is ignored, or cannot be made, the opinion of the surgeon, regarding treatment, will depend entirely on the type of cases he has treated. For this reason,

radical statements concerning treatment should have their sources investigated before being accepted. The advice of Dr. Krecke on this subject appeals to me as being reliable and practical. He recommends operation in complete cases in which the deformity is marked. He is of the opinion that in most of these cases the non-operative treatment is unsatisfactory, and states that operation is without danger, is easy to perform, and gives good results.

While it is true that the pathology in these cases indicates the method of treatment, it is not always easy to determine the extent of the injury from the clinical findings. The reports of the cases of dislocation of the clavicle are of little value in aiding us to determine the extent of the injury from the symptoms present. The reports by Tracy, Krecke, Budinger, and Albers, are the only ones that discuss the deformity with any degree of definiteness. On account of these brief reports it seems to be impossible to draw definite conclusions. However, certain important signs will enable the surgeon to determine positively if a complete rupture of the coraco-clavicular ligaments exists.

(a) Inability to reduce the dislocation. There are three cases of this character recorded. Moore examined his case at operation, and noted that the coraco-clavicular ligaments were completely torn. The two other cases were reported by Nicaise and Reynier. These cases were not exposed by incision. Moore obtained a good result in his case. The results in the other cases were very unsatisfactory.

(b) Extent of the deformity. Only four authors write definitely on this subject. In Albers' case the outer extremity of the clavicle could be separated six centimetres from the articular surface of the acromion. He operated and obtained a good result. He does not mention the coraco-clavicular ligaments; but it is reasonable to suppose that they were completely torn. Budinger reports a case in which the displacement was four centimetres. He operated, but, like Albers, does not mention the coraco-clavicular ligaments. Krecke reports two cases in which the displacement was three centimetres.

From observations on cadavers, and from examining two instances, I believe that in all cases where the articular surfaces of the clavicle and acromion can be separated one inch, the coraco-clavicular ligaments are completely ruptured.

(c) Recurrence of the deformity (mentioned by Albers, Hoffmann, and Krecke) is a symptom which indicates serious injury to

the soft parts, and, it is believed, does not occur unless the coraco-clavicular ligaments are destroyed.

(d) Longitudinal separation of the acromion from the clavicle. In one case (a report of the published cases of dislocation of the outer end of the clavicle will be found in the *Annals of Surgery* for September, 1902) I was able to separate the acromion from the articular surface of the clavicle one-third of an inch. Operation revealed a complete rupture of the coraco-clavicular ligaments. The test was applied as follows: Standing by the injured side of the patient, facing the shoulder, I then placed one hand in the patient's axilla and drew the humerus toward me, resting his elbow against my abdomen. By using slow and steady traction, I was able to separate the articular surfaces of the clavicle and acromion about one-third of an inch. In the same case I could grasp the outer end of the clavicle and easily elevate it above the acromion.

I should diagnose probable rupture of the coraco-clavicular ligaments in all cases of dislocation of the outer end of the clavicle presenting any of the following conditions: (1) Inability to reduce the dislocation. (2) Separation of the articular surfaces more than one inch. (3) Ability to produce a longitudinal separation of the articular surfaces one-third of an inch, or to easily elevate the outer end of the clavicle. (4) Marked tendency to recurrence of the dislocation.

Methods of Operating.—Cooper was the first to do the open operation. In 1861 he exposed a dislocation, resected the ends of the bones, and retained them in position by drilling and uniting them with a suture. Although he obtained a good result, the operation did not come much into use until 1889, when Paci employed it. In the same year (1889) J. Wolff sutured a case with silver wire. The result was good, but as a fistula remained, the wires were later removed. Following these cases, Poirier, Rieffel, and Le Bec report similar ones. In 1894 Albers reported a case wired successfully; and Krecke recorded a similar one in 1897. Although incision, drilling, and wiring have been generally used in treating these cases, other methods have been resorted to. In 1885 Baum passed carbolized silver, subcutaneously, through the end of the ligamentum acromio-claviculare and coraco-claviculare, replaced the dislocation, and tied the ends over a roll of adhesive plaster on the skin. Bardenheuer recommended the Malgaigne clamp, but reports no cases in which it was used. Morris, in 1895, treated two cases by incision, drilling the articular sur-

faces of the acromion and apposed end of the clavicle, and inserting a stiff silver dowel-pin, one inch in length, into the drilled holes. The two articular surfaces were then pushed together and remained easily in the normal position, held by the dowel-pin. Budinger treated a case by driving a long drill point through the acromion into the outer end of the clavicle. This held the bones in position, and a good result was obtained. The drill was removed on the fourteenth day.

The most approved method is exposure of the joint by incision; drilling the clavicle and acromion; passing and tying two absorbable sutures; approximating ligaments and fascia with fine catgut; suturing the skin wound with a silkworm gut. Drainage is not necessary. In operating old cases, it may be necessary to free the clavicle from cicatricial tissue before complete reduction of the dislocation can be accomplished.

There is some diversity of opinion with regard to the material to be used in suturing the bones into position. Silver wire has generally been selected. Absorbable material will be more satisfactory. (Moore is of the same opinion.) The wire sometimes becomes a source of irritation, and its removal may be necessary. Wolff and Moore report such cases.

SUPPURATIVE ARTHRITIS.

Suppuration within a joint cavity presents an indication for operative treatment. If there is reason to believe, from the history of the case and from the local and general symptoms and findings, that a suppurative arthritis might be present, aspiration is indicated to clear up the diagnosis. Early operative treatment is positively indicated in all cases of septic arthritis.

The operation in acute cases should consist of drainage. Unless the case is an exceptionally severe one, efficient tubular drainage will be entirely sufficient. If a large joint is extensively disorganized and has been the seat of a serious infection for a considerable time, complete exposure of the joint surfaces will be the best method of treatment. The application of this method to the knee-joint has given satisfactory results. One objection to the method is that a secondary anesthesia will often be necessary to place the joint surfaces in proper position after the inflammatory process has subsided.

A surgical operation is indicated in cases of chronic suppurative arthritis that continue to discharge for an undue period of time. In

most of these cases dead osseous or fibrous tissue is responsible for the prolonged suppuration. The operation should have for its object the removal of dead or markedly disorganized tissue. Drainage should be provided for after all of these operations.

ARTHRITIS FOLLOWING PNEUMONIA.

The indications for surgical treatment in cases of arthritis following pneumonia have not been definitely determined. The fact that these infections are many times of diminished virulence, and that many serious cases recover without drainage, suggests strongly that open incision and drainage are not indicated in the majority of these cases.

The serious suppurative lesions in the joint that follow pneumonia present a positive indication for incision and drainage. The mild, suppurative cases should never be incised and drained as a primary treatment. If there is reason to believe that the removal of the fluid in the joint cavity is indicated, aspiration should always precede open incision. In treating cases that present serous or sero-fibrinous collections of fluid within the joint cavity, aspiration will seldom be necessary and open incision and drainage will not be required unless the disease becomes suppurative. The advice of Cave, to incise and drain all sero-fibrinous cases at once does not seem to be sufficiently established to accept. Incision and drainage should not be the routine treatment for cases of arthritis following pneumonia. Only the most acute and serious suppurative cases should be subjected to this radical treatment. Aspiration will be all that is necessary in the great majority of the other varieties, for this infrequent complication.

GONORRHEAL ARTHRITIS.

As a rule surgical treatment will not be indicated in the multiple or single forms of gonorrheal arthritis. It is true, nevertheless, that occasionally these cases result in fibrous, or even in bony, ankylosis and that articular and peri-articular suppuration has been known to occur in a joint affected with a gonorrheal infection. While it is true that in the great majority of instances aspiration and other operative procedures will never be required in gonorrheal rheumatism, the fact must not be lost sight of that exceptions to the rule do occur, that drainage of a joint may be indicated, that ankylosis may require treatment, and that, while multiple resections, as prac-

tised by Hanann, may perhaps never be indicated in gonorrheal rheumatism, they have been suggested to relieve certain complications and have, in one instance at least, been put into practice.

If a peri-articular suppuration complicates a gonorrheal arthritis the operative procedure requisite to drain the suppuration should never be extended to the joint cavity. Many times these peri-articular suppurations are not associated with destructive lesions in the joint, and for this reason care should be taken that the superficial infective process is not carried to the articular surfaces.

TUBERCULOSIS OF THE JOINTS.

In arriving at a conclusion for the treatment of tuberculosis of the joints the fact must not be lost sight of that the great majority of these cases begin as a tuberculous osteomyelitis, and not as a tuberculous arthritis. This is especially true in children. Rarely will one see a case of primary synovial tuberculosis of a joint occurring in a patient under the age of fifteen years. Another point that must be remembered in considering the advisability of performing operations in these cases is the fact that the reported cases, treated by operative and non-operative methods, are as a rule not to be relied upon. The opinion may be given that many cases of joint tuberculosis that appear to be cured, later develop tuberculous processes in the joint that was first affected. Many cases of an osseous tuberculous joint affection that remain healed for many years, suddenly become the seat of an active tuberculous process. These occurrences do not speak for or against operative treatment, but do suggest to us strongly that we cannot put too much confidence in the immediate results obtained by any method of treatment.

The treatment of tuberculosis of the joints does not differ from that of tuberculous affections in other parts of the body, from the standpoint of indications. The methods best suited for these cases are gradually changing. Complete resections of tuberculous joints, that were so frequently practised only a few years ago, are rarely performed to-day. Similar marked changes are occurring in other methods of treatment for this serious and not uncommon condition.

No case of tuberculous osteomyelitis, seen early in its course, before the joint surfaces have been involved, should be treated by operation. All of these cases should be treated by immobilization, protection from injury and weight of the body, and by moderate extension

when practical. It is believed by many that passive hyperemia should also be practised in the non-operative treatment for these cases. The results of those who have given Bier's method an extensive trial indicate that many times it is of value. If these cases continue to progress and no improvement is noticed after the mechanical treatment has been faithfully carried out, operation should be done before the disease involves the joint surfaces, or before suppuration occurs. Experience has taught that very good results are usually obtained if the primary tuberculous osseous focus is completely removed under aseptic precautions, and that, at the same time, the patient receives general treatment, such as would be instituted in pulmonary tuberculosis. Injections of iodoform emulsion into localized diseased areas of osteomyelitis have been unsatisfactory. Much can be done to relieve if we make the diagnosis and radically remove the primary tuberculous infection early in the disease. Drainage should not be resorted to.

If tuberculous arthritis has progressed to the stage in which pus has formed and has invaded the joint cavity, and resulted in the production of large quantities of tuberculous material, little can be expected in the way of securing permanent relief unless operative measures are instituted. In the great majority of these cases, especially when associated with local deformity, extension with immobilization should be given a trial before operation is advised. If marked and progressive improvement does not follow the mechanical treatment, incision, followed by atypical resection, with a complete arthrectomy and removal of all diseased bony tissue, should be done without delay. It is possible that in doing some of these operations the wound can be closed without drainage, but as a rule it is advisable to pack these extensive operation wounds and provide for drainage for forty-eight or seventy-two hours. The danger of secondary infection in carrying out this method is not great. Typical resections for tuberculous disease of the joints should rarely be performed, unless the destruction of the bony tissues is very extensive. Resection will rarely be indicated in children, and is not called for in any case unless operative treatment has been unduly postponed.

Tuberculous disease of the joints, associated with abscess formations and with fistulous tracts, that are complicated with secondary infections, always present an indication for operative treatment. Many times these sinuses cease discharging and the patient is appa-

rently much improved. It is only a matter of time, however, until the process is rekindled, the symptoms become more severe and the sinus opens again. If the patient's general condition is good, and extensive tuberculous involvement does not exist in other portions of the body, these sinuses should be dissected and all diseased bony tissue removed. The results many times from this procedure will not be encouraging, but in not a few cases a long-standing cure may be effected. One does not feel safe in saying that the disease can be eradicated in this class of cases by extensive operations upon the bony or soft structures, however, the results are sufficiently good to warrant the operative procedure.

Knee-Joint.—Tuberculosis of the knee-joint that has its starting point in the internal condyle of the femur presents an indication for operative treatment if the diagnosis can be made while the tuberculosis is limited to the femur, and can be removed without exposing the joint. The immediate and remote results following this treatment have in a large number of cases been very satisfactory indeed.

A primary tuberculous synovitis of the knee-joint should be treated by open arthrectomy only after mechanical methods and the injection treatment have been given trials, and have failed. An arthrectomy and not a typical resection will probably be indicated, if a knee-joint, the seat of a tuberculous affection, is extensively diseased. In children removal of the diseased tissue is all that is required; in adults typical resection may be necessary. Amputation in these cases is rarely justified. Generally if a tuberculosis of the knee-joint is so extensive as to require amputation, the general condition of the patient is such, and the existence of advanced tuberculosis in other portions of the body is so positive, that little can be gained by resorting to removal of the extremity.

Ankle-Joint.—The early treatment of an ankle-joint tuberculosis should not be operative. The injection method may be tried but in my experience it has not been satisfactory in these cases. If the tuberculous process has advanced to the stage of suppuration, open removal of the diseased tissue may give good results. As a rule, however, these operations will not be satisfactory. An ankle-joint that has become extensively diseased with tuberculosis rarely heals and remains well. The weight of the body in these cases is in all probability an important factor in preventing resolution and in exciting the latent tuberculous infection. It is held that amputation is en-

tirely justified in a large number of these long-standing and very extensive tuberculous affections that not only invade the joint but produce marked changes in the tarsal bones and sometimes in the tibia.

Wrist-Joint.—It is possible that an excision of a single bone of the wrist may be indicated in certain cases of tuberculous disease if the diagnosis is made early. Most cases, however, show involvement of the majority of the carpal bones, and as a rule secondary infection and sinus formation is present. Resection of the wrist-joint, typical or atypical, as the case demands, is in all probability the method of choice. The results, however, are as a rule unsatisfactory, from the standpoint of elimination of the disease, the usefulness of the extremity and the improvement in the patient's general condition. Most cases show extensive tuberculous disease in other portions of the body and are not materially benefited by the operation.

Upper Epiphysis of the Humerus.—This condition is frequently found in children with a tuberculous parentage, and is amenable to surgical treatment in all cases in which the diagnosis is made early.

Abscess formation, as a rule, does not find its way into the shoulder-joint, but follows the course of the deltoid and points at the middle of the arm. For this reason the abscess can be of long-standing and the shoulder-joint remain free from infection. Open removal of the entire diseased tissue should be practised. Of course it is true that the center of ossification is destroyed by performing this operation but this is of secondary importance when the seriousness of the disease is considered. The results of reported cases of tuberculous disease of this character, that have been treated by early and thorough removal of the diseased tissue, have been very encouraging indeed. Local recurrence does not seem to follow these operations if they are properly done, and secondary infection does not occur.

Hip-Joint.—Resection of the head of the bone, associated with bony operation involving the acetabulum, does not as a rule produce permanent results, therefore operative treatment should not be the method of choice in the great majority of cases of tuberculous coxitis.

ANKYLOSIS.

Operative treatment is indicated in many cases of bony ankylosis. If the loss of joint function has followed a traumatism or a simple

inflammatory condition, operation may be undertaken with the hope of securing a better functional result for the patient. The danger from rekindling latent infection is not marked in this class of cases. Conditions are quite different in the event of bony ankylosis following tuberculous disease. Operations into the joint should then rarely be advised.

The best method of treating these cases is probably by osteotomy through the old joint surfaces, followed by the interposition of fibrous tissue to prevent ossification of the new joint. Osteoclasia should not be advised in true bony ankylosis. In certain cases of ankylosis following tuberculosis, or resulting from processes that have markedly disorganized large joints, division of the shaft of the bone close to the joint should be the operation of choice. Osteotomy of the femur close to the hip-joint has, in some cases, been followed by marked improvement of the function of the extremity.

FLAIL JOINTS.

Excessive mobility of joints, following injuries, osseous or nervous diseases, may be treated surgically many times with gratifying results. The operation should be modified by the general condition of the patient, by the process affecting the joint, and by the particular joint that is involved. Resection, with the idea of securing bony ankylosis, is indicated when there is reason to believe that an immovable joint would be more serviceable than a flail joint.

OSTEOARTHRITIS.

Operative treatment is here sometimes indicated—not with the idea of curing the disease, but for the purpose of meeting the local conditions of extreme pain, interference with joint motion, or excessive mobility. If the local findings indicate the performance of such operations, surgery should not be denied these patients. Those suffering from osteoarthritis usually bear operations well, and many times great benefit follows an operation on an osteoarthritic joint. Excessive pain can sometimes be relieved, a slightly movable joint can be given a much greater range of motion, and an uncontrollable extremity can be made serviceable to the patient by operations in properly selected cases of osteoarthritis.

VIII. MUSCLES, TENDONS AND BURSÆ

Acute suppurative conditions occasionally occur as a result of injuries, as a complication of gonorrhea, or as a part of a general suppurative process. Incision and drainage is indicated here whenever localized collections of pus can be determined in muscular tissue. Curetting or removal of inflamed tissue should be advised against in treating these cases.

INJURIES TO MUSCLES.

Complete division of a muscle, associated with an open wound, presents an indication for primary approximation of the muscle tissue.

If a muscle has been ruptured completely, or in part, as the result of an injury unassociated with an open wound, operation may or may not be indicated. Incomplete, subcutaneous rupture of single muscles does not require operative treatment. If a single muscle has been completely divided, and there exists considerable separation of the fragments, approximation by means of an open operation is indicated. Operation is also indicated in cases of extensive, subcutaneous rupture of the abdominal muscles.

In performing these operations it is, as a rule, not necessary that they should be delayed until the primary, local symptoms of the injury have subsided. Early operation has no objections in this connection.

MUSCLE HERNIA.

A hernia of a muscle does not require primary operation, unless it is large and cannot be kept in position. Compression, relaxation and immobilization should be tried in these cases at the primary treatment. If these measures fail, and if the hernia has been of long standing, operation is indicated. The edges of the hernial opening should be vivified, and the aperture closed by approximating the muscle sheath with absorbable material.

MYOSITIS OSSIFICANS.

So little is known about the condition commonly called myositis ossificans that no sound advice can be given regarding its treatment by operation in any of its forms.

Operation should not be advised in cases of general myositis ossificans, unless a localized bony mass produces severe pain or other serious inconvenience. If such a condition exists, and it is reasonable to believe that operation will be followed by relief, we are justified in removing local masses, even in general cases.

In cases of myositis ossificans progressiva, of which Matthes has collected forty-two examples, there is no indication for operative intervention.

If the disease is localized, we are justified in resorting to operative treatment to remove bony masses that cause suffering or inconvenience to the patient. The same indications hold good in advising treatment for cases of myositis ossificans following trauma. The reports of Keen, Taylor, Pollard, Munro and others clearly show that operation may be of value in cases of local myositis ossificans.

SUBCUTANEOUS OR OPEN RUPTURE OF TENDONS.

The rupture of a tendon presents an indication for approximation regardless of the tendon that is injured, or the existence of an open wound. Operation should be done early, but a successful result may be expected in most instances if a ruptured tendon is not approximated for a considerable time after the injury has occurred. Operation should be advised in all of these cases, regardless of the time that has elapsed after the injury.

AVULSION OF TENDONS.

When it can be determined that a tendon has been torn loose from its attachment operative treatment is always indicated. These cases are of rare occurrence but they are important from the standpoint of treatment. Hoffman has shown that good results cannot be expected unless an operation is performed on all of these patients. He reports five examples of this injury that were treated by operations, with very satisfactory results. He is a firm believer in the open method of treatment for all such injuries.

If the injury to the surrounding tissues is quite severe, but is not associated with a skin wound, operation should not be performed at once. The contused tissues should be allowed to recover to some extent before they are exposed by an incision. The delay in placing the tendon in its proper position does not interfere with the ultimate result. Operation that is delayed until the reaction to the trauma has

subsided markedly lessens the chances of infection occurring. If the injury to the surrounding tissues has not been severe, then there is no objection to operating at once after the injury. If the avulsion of the tendon is complicated by an open wound, operation should be done immediately.

TRIGGER FINGER.

This condition is commonly due to a local disproportion between the tendon and its sheath. In the early stages manipulative treatment may arrest the progress of the affection, or may improve the condition. Most advanced cases of trigger finger warrant operative treatment. The local conditions that are responsible for the symptoms should be exposed by incision. If the sheath is found markedly contracted the constriction should be divided. If a local enlargement of a tendon dependent upon the existence of a fibroma or other growth is found excision of the abnormal growth is indicated.

TENOSYNOVITIS.

Acute, non-suppurative tenosynovitis does not demand operation. If the condition is dependent upon infection through a wound, and the local and general symptoms and findings indicate a serious process, direct operative treatment upon the tendon sheath should not be advised until suppuration has occurred. If there is reason to believe that the primary wound through which the infection entered is not draining properly, this should be opened; but no incisions into the infected sheath should be made during the very early stages of these infections. Immobilization, with the application of heat, should be the method of choice in the early stages. Incision and drainage of the tendon sheaths in the fingers, the palms, or other portions of the body, is indicated only after suppuration has occurred. Opinion is that the progress of these infections is not arrested by early multiple incisions, and that a more useful extremity will be obtained if operations are limited to securing drainage after suppuration has taken place.

CHRONIC TENOSYNOVITIS.

Chronic, suppurative tenosynovitis that refuses to heal usually suggests that the inflamed area is not properly drained, or that a considerable amount of dead tissue is present and is responsible for the continued suppuration. Operation is indicated in these cases

that do not show progressive improvement. Efficient drainage with the removal of dead tissue are required to terminate the infective process.

CHRONIC, NON-SUPPURATIVE TENOSYNOVITIS.

The very mild forms of non-suppurative tenosynovitis do not demand operation. If the condition produces considerable deformity, if it is painful or progressing in severity, or if there is reason to believe from the history of the case, or the presence of loose, foreign bodies within the sac that the infection is tubercular, operation is indicated. While aspiration and the injection of chemicals may succeed in curing a considerable number of these cases, complete excision usually gives good results, and should be the method of choice in all but the mildest types.

GANGLION.

A ganglion presents an indication for surgical treatment only when it produces deformity, or otherwise inconveniences the patient. Removal of the sac by means of an open incision should be the method of selection. Subcutaneous rupture of the ganglion is uncertain in results, and is often followed by as much suffering and inconvenience as complete excision.

BURSITIS.

Acute, non-suppurative bursitis does not call for surgical measures. Immobilization, compression, and local applications are sufficient in treating these cases. The existence of pus in an inflamed bursa presents an indication for drainage if the infection is a virulent one. If an inflamed bursa remains continuously tender, and is the seat of occasional acute, inflammatory exacerbations, excision of the bursa is indicated. Excision is also indicated in chronically inflamed bursa that markedly inconvenience the patient. Compression, aspiration, and injection of chemicals are indicated in only a limited number of selected cases of bursitis. The removal of the sac is the method of choice in most of these cases.

Drainage should be provided for after the removal of any bursa that has been the seat of an inflammation sufficiently severe to produce an elevation of temperature.

Bursæ in certain portions of the body are dependent upon, or are associated with, other changes that modify the treatment indicated.


A bunion is, in most instances, associated with hallux valgus. The treatment of these associated conditions is discussed in the chapter on Deformities. In treating a bursa in any portion of the body care should be taken that the co-existing conditions that many times are responsible for the bursitis, or are dependent upon it, should receive proper attention.

IX. THE UPPER ABDOMINAL REGION.

On account of the close relationship between important and distinct organs of the upper abdominal region, and for the reason that it is impossible many times to make a diagnosis of the conditions that are causing the symptoms, or even of the organ that is affected, and owing to the fact that the majority of acute and chronic diseases of this region are treated successfully only by operation, it is well to discuss the indications for treatment of this region under a heading and a symptomatology that includes the most common diseases of these organs that are most closely associated, anatomically and physiologically, and that many times follow each other in successive involvements from a primary pathological condition that has had its starting point in one of them. The results obtained by operative treatment, and the knowledge of these pathological conditions gained by laparotomy, have shown clearly that operative treatment is the one of choice in the great majority of all lesions of the upper abdominal region, and that the majority of the complicated and serious cases should not occur at all. These cases are, as a rule, the result of delay, and our aim should be to prevent their development, instead of to devise operations that may be successful in relieving them. Most of these affections of the upper abdominal region are dependent upon diseased processes that began as infections in the gall bladder, or as ulcerations of the pyloric end of the stomach or of the duodenum. Our duty in dealing with these diseases is to recognize them while they are limited to the primary seat or point of origin. If a probable diagnosis can be made at this stage then operative treatment is demanded for the reason that the process can be terminated while it is yet in the early period, and the results of operative treatment in these beginning diseases are extremely satisfactory from the standpoint of mortality and give, in almost every instance, complete and permanent relief.

Operation is indicated in the majority of acute diseases involving the upper abdominal region. Perforations in this locality are treated successfully only by early operative intervention. The same may be said of acute and serious hemorrhage, some forms of acute pancreatic disease and of virulent infections, especially those in the gall bladder. The mortality from some of these operations is great,

while the results obtained in others is not entirely satisfactory. Our aim should be not so much to be able to recognize early acute perforations, acute infections or acute pancreatic disease, as it should be to recognize clearly the pre-existing conditions that are responsible for these serious complications, and to be able to advise operation before the patient suffers from any of these acute and many times fatal conditions. We should look upon perforations, acute pancreatic disease, and many times acute infections of the gall bladder, as complications and not as primary diseases. Acute serious disease of the pancreas is in most every instance secondary to gall bladder disease, and the treatment should be surgical operation, not for the pancreatic involvement but for the altered conditions of the biliary apparatus, that in all probability have existed a long time before the pancreas has become involved, and that can be safely and successfully dealt with if surgical treatment is resorted to at the proper time. Perforations of the duodenum should rarely occur. The great majority, if not all, of these cases give a history of long-standing symptoms before the perforation. We should not wait for the duodenum to rupture before we advise surgical treatment. The treatment for possible perforation of the duodenum is best carried out when the conditions that are responsible for the ulceration are removed before the perforation has occurred or before periduodenal adhesions have become extensive. The same is true, to a lesser extent, in the treatment of perforations of ulcers of the stomach. Ninety per cent. of these cases give a history of symptoms before the perforations occur; and when there is reason to believe from the symptomatology or history of the case, and the physical and chemical findings, that a gastric ulceration is present, or that the patient is suffering from some disease in the upper abdominal region that does not get progressively better without operative treatment, exploration should be insisted upon. If the foregoing suggestions are kept in mind and are carried out in practice, operations for perforations of a gastric ulcer will rarely be performed; a perforation of the duodenum will rarely occur; and an acute pancreatitis will be extremely uncommon. Of course, if a case has not come under observation until a perforation or other acute complications have developed, operation should be done at once. We should not refuse these patients operation on account of their bad physical condition, or for the reason that operation has been unduly delayed. All of these cases should be given the benefit of an



exploratory incision, even if the chances for recovery are slight. The technique of the various operative procedures that have been recommended for these conditions is well known by those who are capable of doing abdominal surgery and a discussion of the various methods would here be out of place.

Chronic diseases or subacute affections of the upper abdominal region in almost every instance present indications for operative treatment. As has been stated in the foregoing, the majority of these conditions began as subacute or as chronic diseases. There is no reason why we should not be able to recognize these diseases while they are not of a serious character, and as the fatal results following operation, and the post-mortem findings in these advanced cases, have shown us clearly the succession of pathological changes that so often occurs when surgical treatment has not been employed at an early date, we are justified in insisting upon early operative attention in the great majority, if not all, of these inflammatory and ulcerative diseases of the biliary apparatus, the stomach and duodenum.

It seems that the great majority of the diseases of the upper abdominal region have their origin in one of two organs, and in one of two processes. Inflammation of the gall bladder, or an ulceration of the stomach or duodenum, is in all probability the starting point of all of these conditions. If this is true our aim should be to recognize early inflammations of the gall bladder, even before gall stones have formed. We should recognize at their beginning ulcerations of the stomach or of the duodenum, and on account of the ease with which these conditions can be treated when they are of short duration and are not associated with complications, and on account of the successful results that follow treatment in this stage, we should insist upon at least exploratory operation whenever the existence of a cholecystitis, or of an ulceration, can be determined with a reasonable degree of certainty. If we could operate upon these cases in the early stages, extensive adhesions would rarely be met with, and operations for the relief of carcinoma of the organs of the upper abdominal region would be less frequently performed. It is probable that such long-standing ulcerative or inflammatory processes predispose to cancerous involvements in not a few cases.

THE BILIARY APPARATUS.

Most of the diseases of the biliary apparatus are the result of infection. Occasionally the infection may be acute and result in the formation of suppuration, or even of gangrene, and perforation of the organs, but as a rule the infection is not virulent at the start, has existed for a considerable period of time, and, in the great majority of cases, has produced quite definite symptoms before these complications occur. The presence of gall stones, which is a common condition, is in all probability dependent upon a primary infection of the gall bladder. These conditions present indications for operation in almost every instance.

GALL STONES.

The presence of gall stones in the gall bladder, or in the ducts, offers a positive indication for operation. Of course it is impossible to say positively in all cases that gall stones are or are not existent, and for this reason we must depend upon the symptomatology of the case for indications for operative treatment. It is generally agreed that early operation is the treatment of choice, and that we should insist that the patient does not delay surgical aid in all cases in which the existence of gall stones is probable.

It appears wise to advise surgical operation in any patient who has suffered from one severe and typical attack of biliary colic. If the attack has been severe and the symptoms quite typical it is not necessary that previous symptoms should have been complained of, or that a second attack should be waited for. We may also advise operation if the patient has suffered from a moderately severe, and perhaps not typical, attack of gall stone colic that has been preceded by dyspeptic symptoms for a considerable period of time, and that is followed by tenderness over the region of the gall bladder. Repeated attacks of biliary colic, with or without infection, of course present indications for operative treatment. If a patient has suffered from repeated attacks of indigestion, with pain and with tenderness over the gall bladder, operation should be advised. This is especially true if a rise of temperature accompanies the abdominal distress. In long-standing cases, showing dyspeptic and neurasthenic symptoms, it is probable that gall stones are responsible for the symptoms, even if no attacks of biliary colic have occurred for years, and no positive symptoms of gall stone disease can be obtained. Long-

standing cases of gall stones, in which adhesions and involvements of the gall bladder have practically destroyed the organ, may give no symptoms of acute colic but complain only of digestive disturbances. In these a history of a biliary colic, years before the examination is made, should be considered significant of the presence of gall stones in the gall bladder or in the cystic duct.

The passage of a gall stone and the occurrence of a temporary jaundice are not positive indications for an operation, nor do they contraindicate an operation. An attack of biliary colic that has been followed by the passage of a gall stone as a rule presents an indication for an operation. The fact that one gall stone has been passed strongly suggests that others are present. For this reason surgical interference is advisable.

Operation of Choice.—The operation that should be performed for the relief of gall stone disease cannot always be determined before the incision is made. Drainage should be done in all of these cases, with the possible exception of removal of a cystic gall bladder in which the cystic duct has been entirely occluded, and in which the gall bladder contains no bile. It is probable that drainage can be dispensed with in cases of stone in the duodenal portion of the common duct, in which the operation has consisted of incision of the anterior wall of the duodenum, with removal of the stone into the lumen of the intestine. In all cases of cholecystostomy drainage should be provided for, not only of the gall bladder but, as a rule, of the tissue outside of the biliary apparatus. Even in cases in which the adhesions are slight, and infection probably not present, better results have been obtained by draining the peritoneal cavity outside of the gall bladder than when no drainage has been provided for except through the mucosa of the gall bladder. Drainage should always be provided for in all cases in which the common duct is incised. It is not necessary that the duct should be sutured: in fact, it is advisable that it should not be sutured. Drainage should always be insisted upon in all cases in which operation is done on the biliary apparatus for conditions complicated with acute infection.

Removal of the gall bladder has been frequently suggested to, in many instances, replace cholecystostomy. Removal of the gall bladder should be undertaken only for especial indications. The operation is more serious than cholecystostomy and in the great majority of instances does not produce as satisfactory results. Re-

removal of the gall bladder should never be undertaken for a condition associated with acute infection, unless the infection is within the gall bladder and has resulted in gangrene of this organ. All cystic gall bladders, or gall bladders with complete occlusion of the cystic duct, should be removed. The same is true in cases of a markedly degenerated or cicatrized gall bladder. As a rule, in these cases it is preferable to remove the mucosa of the gall bladder, while the remaining structures of the organ are left. The advantage of this operation is that it can be safely and quickly done and that it accomplishes all the results of complete cholecystectomy.

In regard to the technique of cholecystectomy and cholecystostomy it is generally agreed that it is best to begin removal of the gall bladder at the cystic duct, and that it is not necessary in draining the gall bladder to suture the viscus to the abdominal wall. The inversion of the opening in the gall bladder and attaching the organ by means of a purse-string suture to a rubber tube is probably the method of choice in doing a cholecystostomy.

CHOLECYSTITIS.

Acute and chronic varieties of cholecystitis are diseases that can be treated successfully only by operation. Most of the subacute and chronic varieties that are capable of producing distressing symptoms are associated with gall stones and of course present positive indications for operative treatment. The acute varieties of cholecystitis may be associated with gall stone disease, may follow typhoid fever or zymotic diseases, or may be primary inflammations originating in the gall bladder without previous known cause. (In 1904 I was able to collect eleven cases of acute, primary cholecystitis that were not associated with gall stones and gave no history of having followed previous disease. All of these acute primary cases present indications for operative treatment.) I am of the opinion that the advice of Ochsner, not to operate during an acute attack of cholecystitis, is dangerous. It seems best that all acute cases should be operated upon as soon as the diagnosis is made. Cholecystostomy meets the indication in the early stages and is not so severe on the patient as is cholecystectomy. At present removal of the gall-bladder is advised only in cases of extensive gangrene, and drainage of the gall-bladder in all other acute cases. The presence of stones does not modify the treatment. In acute infected cases cholecystostomy

has a smaller mortality than has cholecystectomy. If the foregoing advice is followed, a secondary operation may occasionally be required. This is not especially objectionable. Secondary operations on the gall-bladder are usually safe and are not complicated with acute infection.

CANCER OF THE GALL-BLADDER.

Carcinoma is not an uncommon condition, but presents an indication for operative treatment if a diagnosis is made before the disease has advanced to a stage that renders the operation hopeless. Most of these early cases are found accidentally in performing operations for other conditions. They should be treated by complete removal of the gall-bladder. Carcinomas involving the bile ducts are uncommon in occurrence, difficult or impossible to diagnose, and rarely amenable to surgical treatment. If the tumor is recognized early it is probable that excision, followed by a cholecystenterostomy, would be the method of choice in dealing with them. The presence of jaundice, without attacks of colic and without tenderness over the region of the gall-bladder, occurring in a patient who is somewhat emaciated and well along in years, would suggest the presence of a neoplasm in the common or in the hepatic ducts. It is impossible to differentiate these cases from malignant tumors involving the head of the pancreas. In pancreatic involvement, however, urinary findings and digestive symptoms might suggest the association. Glycosuria, or presence of glycerine in the urine, or fatty stools, would not be expected to occur as part of the hepatic or common duct involvement.

While it is impossible to diagnose these cases with any degree of certainty, progressive painless jaundice, associated with wasting of the patient, should be looked upon as a surgical condition, especially if malignant disease of the liver and hepatic cirrhosis can be reasonably excluded. The operation should, in a sense, be exploratory and the operation that is performed must be guided by the conditions observed after the incision is made.

THE STOMACH.

During the last few years the treatment of diseases of the stomach has been practically revolutionized. We have learned that in the great majority of instances, especially in chronic conditions,

it is the mechanics of the organ that are disarranged. We have also learned that the secretory changes of the stomach are not of importance in producing symptoms, and that chemical treatment is of little avail in many conditions of this organ. We have also learned that operative treatment for many diseases of the stomach can be successfully carried out, that the operations are, as a rule, not particularly dangerous, and that the results in non-malignant cases are very satisfactory and appear to prove permanent.

The great advance made in recent years in all diseases of the stomach has not resulted so much from chemical and pathological investigations as it has from the observations at operation, and the results obtained by men who had courage enough to perform serious operations that were in the experimental stage. A study of the pathologic conditions observed at operation, the results obtained from operative procedures, and what has been determined regarding the relationship between pathologic changes and symptoms, clearly indicates that, in a large percentage of these instances diseases of the stomach began as local affections and existed as comparatively mild lesions for a considerable period of time. It is generally agreed that the most serious and complicated cases and those that are most difficult to relieve by surgical means, are the result of complex influences that are preventable. All of this means that if we expect to materially improve the results obtained by treating stomach diseases, we should recognize these cases in their beginning, and should do the necessary operations while the patient is still in good health and before multiple lesions or serious complications develop.

It is generally admitted, at the present time, that we should, in all cases where possible, avoid operative interference in acute stomach lesions. Of course, it is understood that operation is indicated and positively demanded in cases of acute perforation of the stomach, in certain rare suppurative processes, and occasionally in uncontrollable hemorrhage. Although this is true, it must be admitted that these serious complications rarely cause the primary symptoms from which the patient complains. It is unusual that a perforation of the stomach ensues when the patient has given no symptoms of a previous ulceration. It is quite unusual, also, that a serious and fatal hemorrhage would be the first manifestation of a lesion that was capable of such bleeding. If we study these cases carefully, recognize the indications for operative treatment, and do not delay opera-

tion, we shall rarely be called upon to employ surgery for gastric perforation or acute hemorrhage.

Another point that is generally agreed upon at the present time is that in most instances operative treatment should be advised for subacute diseases of the stomach. Ulcerations, or other complications that have given acute symptoms, but have gradually subsided, should be subjected to operative treatment before another exacerbation occurs. The results in these cases are satisfactory and the operation is usually not extremely dangerous, for the reason that multiple complications have not occurred and the patient's general condition is not materially affected.

All chronic diseases of the stomach that resist non-operative measures for any considerable period of time should be subjected to operative treatment. It is not necessary that a positive diagnosis be made, nor is it always essential that the condition be recognized as a surgical one. If it can be clearly determined that the patient is not a primary neurotic, and the stomach symptoms are of long-standing and do not yield to efficient treatment in from four to six weeks, operation should be advised. The operation should consist of an exploratory laparotomy, followed by a meeting of the indications that are found after the incision has been made. It is probably true that if this advice is followed an occasional unnecessary operation will be performed. On the other hand, if these patients are subjected to exploratory operation in the great majority of instances a definite surgical lesion will be found, the condition will not be advanced, complications will not be numerous or serious and a speedy and permanent recovery can be expected. These operations will also aid us materially in reducing the mortality of gastric cancer. Many of these carcinomatous cases do not present positive symptoms until the disease has advanced to a stage that renders surgery hazardous, if not hopeless.


While at the present moment the trend of surgical opinion is towards early operative treatment, and the field for operative interference is gradually widening, the fact must not be lost sight of that rapid and marked changes are occurring in this line of work. The nature of pathologic conditions of the stomach, their indications for operative treatment and the best operation to perform may be seen in a different light to-morrow than they are to-day. For this reason every one who does extensive operative work on the stomach should

consider all of these operations as being in the experimental stage, and should not feel that, at present, any operation or any pathologic condition holds a definite place in surgery. Careful observation should be made in all of these cases with the idea of suggesting new facts regarding their nature, new ideas regarding the indications for treatment and new methods for the operative technique.

ULCER OF THE STOMACH.

A few years ago ulcer of the stomach was considered a medical disease. At the present time the majority of these cases that do not recover spontaneously must submit to surgical operations. We are gradually subjecting all forms of gastric ulcer to operative treatment and at present, according to Leube, any gastric ulcer that does not heal spontaneously in five weeks presents an indication for operation. This advice may seem radical, but there is room for the opinion that it is the most conservative treatment for gastric ulcer.

No operative procedure for the relief of gastric ulcer should be performed during the acute stage of the disease, unless complications make it imperative. It is better to let the acute symptoms subside, and if possible let the ulcer become subacute before the operation is done. Of course, if a perforation occurs, which is not likely if the case is handled properly, laparotomy must be done at once. The same is true, to a less degree, of severe and uncontrollable hemorrhage. In these cases, however, we should refuse operation unless there is reason to believe that the hemorrhage will not cease spontaneously and that the patient will bleed to death if operation is not done. The reason for avoiding operations in these acute cases is that the mortality is high and the method of operating not always easy to determine. For instance, in operating for acute hemorrhage we may be unable to locate the point of the bleeding, and, while doubtless gastroenterostomy is indicated, we have no assurance that this will relieve the patient. The same is true in dealing with perforations. A perforation may be found and closed, but the results many times are not satisfactory and secondary perforations may follow. We should do all that is within our power to prevent perforation in gastric ulcer. In the acute stage rectal feeding should be insisted upon, and operation should not be delayed in any subacute or chronic case. In chronic gastric ulcer operation should be performed if the symptoms are more or less continuous, if the pain is severe,



or if the patient has suffered from acute attacks of vomiting, pain and perhaps hemorrhage. If the patient complains of attacks of more or less gastric pain, hypersecretion, gas and indigestion, which Hartmann describes as the syndrome of gastric ulcer, operation should be done without delay. Operation should also be advised in all cases in which a gastric ulcer has resulted in obstruction of the outlet of the stomach, deformity of the organ, or perigastric adhesions. All cases of chronic or long-standing dyspepsia that give a definite history of gastric ulcer that existed years previously, present positive indications for operative treatment. Repeated hemorrhages also give us certain indications for operation. The same is true of one severe hemorrhage that is followed by gastric pain, or pronounced digestive symptoms.

The Operation of Choice.—It is probable that in most cases of chronic gastric ulcer gastroenterostomy will be the most efficient means of securing permanent results. This operation is in all probability best performed by the posterior suture method; the opening in the jejunum being made within two inches of its origin. In cases in which the patient is in an alarming condition the operation should be performed rapidly. The anterior method with the button can be depended upon to give good results. The elastic ligature has proven satisfactory in the hands of many. This method should not be employed in cases in which immediate drainage of the stomach is desired.

In long-standing cases of gastric ulcer that have resulted in much thickening and scar formation of the pylorus, it is probable that pylorotomy, as suggested by Rodman, should be the operation of choice. The advantages of this method are that the ulcer-bearing area which is extensively diseased and likely to produce future trouble is completely removed, and that the possibility of carcinoma of the stomach occurring in this chronically diseased tissue is avoided. Opinion is offered that this operation, advised by Rodman, will be more often performed in the future than it has been in the past.

Operations for Complications of Gastric Ulcer.—Marked and long-standing adhesions that interfere materially with the motion of the stomach, and many times produce severe pain, should be operated upon in all instances. Robson has secured very satisfactory results by simply separating these adhesions from the organ. It is probable that this method will be the operation of choice in a large

number of these cases, but in those in which the adhesions are extensive and the musculature of the stomach weak it is probable that gastroenterostomy should also be performed.

PERFORATION.

The treatment of perforation of a gastric ulcer should be prophylactic whenever possible. By this is meant that a gastric ulcer that can be diagnosed should be treated when it is in a subacute or early chronic stage, and perforation be avoided by these operations. Of course it is probable that acute perforation of a gastric ulcer may occur, and whenever this condition is present operation is demanded at once. The operation of choice in these cases should consist of closure of the perforation and gastroenterostomy. Multiple perforations should be looked for, as they are not infrequently present. The object of doing a gastroenterostomy is to relieve, if possible, the cause of the perforation and to prevent the occurrence of further complications.

HEMORRHAGE.

It is generally admitted that a gastroenterostomy, or in certain selected cases a resection of the pylorus, is positively indicated in gastric ulcer associated with frequent small hemorrhages, or with more than one severe hemorrhage. In fact any chronic ulcer that bleeds is an indication for operation.

In cases of acute serious hemorrhage occurring in gastric ulcers operation should not be performed unless the bleeding cannot be controlled by other measures, and threatens to speedily terminate the life of the patient. The objection to operating here is that the patient is in poor condition, the mortality is high, and the operation occasionally does not stop the hemorrhage. If a laparotomy is performed in acute hemorrhage from a gastric ulcer there are many methods advised to be practised in dealing with the bleeding point. Pylorectomy would many times meet the indications, but it is a serious operation to do in these acute conditions. Excision of the ulcer can be effected successfully in some of these cases. The mortality from this procedure, however, has been high. The method of Andrews, which consists of a ligation of all of the coats of the stomach, including the ulceration, will probably be the method of choice in certain instances involving the body of the stomach. It is probable that while all of these methods, and many others, may occasionally be indicated gastro-

enterostomy will doubtless be the operation that will be most often performed in dealing with the acute hemorrhage of gastric ulceration. Simple drainage of the stomach has often been followed by better results than has any of these other methods.

OBSTRUCTION.

Obstruction of the pylorus, or first portion of the duodenum, presents positive indications for operation and the procedure of choice, in the majority of these cases, should be gastroenterostomy. Pyloroplastic operations, or the operation described by Finney, will doubtless not be so efficient in these cases as will simple gastroenterostomy, draining the stomach in its most dependent point.

The results of operative treatment for gastric ulceration are very encouraging indeed if the operations are performed before the patient's general condition is materially affected and when serious complications have not occurred. At the present time gastroenterostomy is the operation of choice in most of these cases. Finney's operation is one that is easy to perform and has a certain field of usefulness. Its application is not so broad, however, as is gastroenterostomy. The Mikulicz-Czerny method of performing gastroenterostomy, which consists of the posterior suture operation, uniting the stomach to a transverse incision three-fourths of an inch from the beginning of the jejunum, has been recommended very highly by many men, but has not proved, according to the majority of operators of this country, to give more satisfactory results than do other methods of gastroenterostomy. Entero-anastomosis is not essential in doing an ordinary gastroenterostomy, if the intestine is attached to the lowest point of the stomach.

The vicious circle that occasionally follows gastroenterostomy, will rarely occur if the stomach is drained at its lower point and the pylorus markedly narrowed or completely occluded. In doing a gastroenterostomy in cases in which the pylorus is not narrowed, this orifice should be closed before the operation is considered complete. The occurrence of ulcers in the jejunum, that have been observed to follow gastroenterostomy done for benign conditions, is a complication that in all probability cannot be avoided. Tiegel and others have discussed the occurrence of this condition, but so far we have no means of preventing it and its treatment must be operative, especially if perforation occurs.

number of these cases, but in those in which the disease is extensive and the musculature of the stomach is weakened, gastroenterostomy should also be performed. This should be

PERFORATION

The treatment of perforation of a gastric ulcer is surgical removal possible. If the ulcer has been recurrent and the disease is recognized early, it can be diagnosed and treated while the patient is in the chronic stage, and perforation be avoided. If the ulcer is the seat of carcinoma, it is probable that acute perforation will occur, and whenever this condition is diagnosed at once. The operation of choice in perforation of the stomach is not only closure of the perforation and gastroenterostomy, but also the condition of the patient should be looked for, as they are. It should be recommended that the object of doing a gastroenterostomy is to relieve the early exploratory cause of the perforation and to prevent further complications.

HEMORRHAGE

It is generally admitted that in certain selected cases a resection of the stomach cannot be depended upon in gastric ulcer associated with hemorrhage. If there is reason to suspect more than one severe hemorrhage, exploratory operation

bleeds is an indication for operation. In cases of acute serious hemorrhage, operation should not be performed until the patient is controlled by other measures, and the patient is in poor condition, the mortality does not stop the hemorrhage. In acute hemorrhage from a gastric ulcer, the operation should be practised in the stomach. The operation would many times be advised to do in these acute cases. The operation is effected successfully in the stomach, however, has been effected successfully in the stomach, however, has consisted of a ligation of the ulceration, will probably involve the body of the stomach, and in

can be accomplished only by the work of Cuneo and Hartmann, Mikulicz, Mayo, Hartmann, and others. The operation for cancer of the stomach, removing a carcinoma of this kind, all of the lesser curvature of the stomach, perhaps one-half or two-fifths of the stomach. The operation should be followed by gastroenterostomy. The observations of the operation show that there is little danger in the removal of the stomach and a considerable portion of the stomach in cases of extensive carcinoma of the stomach.

of carcinoma of the stomach. All such operations, however, have a high mortality within a year's time, and will be demanded only in excep-

tional cases. The operation, however, is entirely justifiable if the position and extent of the carcinoma warrants such a procedure.

The ultimate results of the radical treatment of carcinoma of the stomach are gradually becoming more encouraging. The mortality can be reduced and the number of permanent cures of this disease can certainly be made larger by early diagnosis, radical removal of the growth and the frequent performance of exploratory laparotomy.

We are justified, in advanced cases of carcinoma of the stomach, in doing palliative operations to prolong the life of the patient and to relieve suffering. Gastroenterostomy will be the operation that is most often suggested to accomplish these results. It is probable that drainage of the stomach in these advanced cases prolongs the life of the patient from six to nine months, and many times is the means of alleviating great suffering. Gastrostomy may occasionally be indicated as a palliative measure in carcinomatous lesions of the cardiac end of the stomach that produce obstructions. This operation should be performed by making use of one of the so-called valve methods. If properly done it is not followed by a large mortality and gives satisfactory results. In cases of diffuse involvement of the stomach, with carcinomas that are so extensive as to contraindicate the performance of any radical operation, jejunostomy may occasionally be indicated as a means of nourishing the patient. It is probable that this operation will rarely be required but, theoretically at least, it should be performed without hesitation with the idea of affording the means by which the patient can be sustained.

SARCOMA OF THE STOMACH.

Although our knowledge at this writing regarding the nature and treatment of sarcomas in general plainly teaches that surgery alone can be expected to cure gastric sarcoma, the achievements of operative treatment for this disease have thus far been of little value to humanity. The writings of Alesandri, Schlesinger, Fenwick, Manges, et al. show that operation for sarcoma of the stomach has, in the past, not been productive of satisfactory or permanent results. It is probable, however, that the failure to cure cases of sarcoma of the stomach by surgical measures has not been wholly the fault of the method of treatment or of the technic but can be attributed largely to delay. The patient observed by Dock, who was well four years after-

having a lympho-sarcoma of the stomach removed, should stimulate the operative treatment of these not common but progressively fatal growths of the stomach.

On account of the fact that the successful treatment of sarcoma of the stomach depends on an early diagnosis, a brief statement touching the frequency and certain of the characteristics of this disease will not be out of place.

Sarcoma of the stomach occurs infrequently, but is probably not so rare as ordinary medical teaching would lead one to believe. A careful study of the disease by a few has resulted in an apparent increased frequency. Schlesinger, in 1897, was able to collect only thirty cases, while in 1900 more than sixty cases had been recorded. The reports of Perry and Shaw, of Haberkandt and of Czerny indicate that sarcoma of the stomach is not extremely rare; while Fenwick states that sarcomas constitute five to eight per cent. of all gastric tumors.

Sarcoma of the stomach may be expected to occur at any age. Fleiner states that the condition may be congenital. While as a rule sarcomas occur earlier in life than do carcinomas, the age range is very great indeed. Finlayson reports a sarcoma of the stomach in a patient three and one-half years of age, while the patient observed by Malzof was seventy-eight years old.

Although there is nothing characteristic in the frequency of occurrence, the symptomatology, or the physical findings of sarcoma of the stomach that enables us to recognize the condition in its beginning, it is well to bear in mind that sarcoma of the stomach is not an extremely rare disease; that generally it has its starting point in the gastric submucosa; that involvement of the mucosa of the stomach does not occur early in the disease; that obstruction to the orifices of the stomach is uncommon as compared with such development in gastric carcinoma; and that a sarcoma of the stomach may grow to a large size without involving the gastric mucosa and without producing stomach symptoms.

GASTRIC DILATATION.

This, in all probability, is in most instances a secondary condition. Not all of these cases present indications for surgical treatment. If a stomach is permanently dilated and refuses to do its work, and is not associated with obstruction of the pylorus, it is probable that

surgery will be of benefit. On the other hand, although Kramer says that cases of gastric dilatation that are not improved after four weeks of efficient treatment should be operated upon, the opinion is ventured that we should select carefully those that can be relieved only by surgery. Many of these are found in neurasthenic patients, not a few of them are associated with definite obstructions or adhesions, and many times the dilatation of the stomach is associated with prolapse of other abdominal organs that might be responsible in part for some of the symptoms. If it can be determined that in all probability the dilatation of the stomach is responsible for the symptoms complained of, and the condition does not improve under medical and hygienic measures, gastroenterostomy should be performed. Gastroplastic, or operations diminishing the size of the stomach, should not be recommended. The results have not proved to be permanent.

GASTROPTOSIS.

Gastroptosis, not associated with marked prolapse of other abdominal organs and producing marked and long-continued symptoms, should be treated surgically. In selecting these cases for operation the nervous element must be given especial attention, and it also must be ascertained that the displacement of the stomach is producing most of the symptoms and is not a part of the general ailment. Operations performed for this condition by attaching the stomach to the parietal peritoneum, have not been followed by satisfactory results. Rosving, Buret, Coffey, Davis, Bier and others have followed this method but their results have been disappointing. The operation of Hartmann, which fixes the stomach to the diaphragm, has been followed by better results, in all probability for the reason that the motion of the stomach is not materially interfered with. From the reports of Beyea and others who have practised his method, it is probable that operations shortening the gastro-hepatic and gastro-splenic ligaments should be the ones of choice. This operation elevates the stomach and does not interfere with its motility. In gastroptosis the fact must not be lost sight of that the operative treatment is in the experimental stage, and while Beyea's operation seems to have the preference it cannot be looked upon as presenting a solution of the problem.

CIRRHOSIS OF THE STOMACH.

It has been a much discussed question whether a non-malignant cirrhosis of the stomach exists. The preponderance of the evidence, however, demonstrates to us clearly that while it may be at times difficult, or even impossible, to distinguish between a diffuse carcinoma of the stomach and a cirrhosis ventriculi, still in rare instances a benign cirrhosis of the stomach does occur. Andral, Cruveilhier, Brinton, Habershon, Wilks, and most of the earlier writers have clearly drawn the distinction. The evidences on which their opinions were based it must be admitted were imperfect. However, the opinions of so many close clinical observers are not without their weight in this matter. Most of the recent writers give the condition recognition, but their statements are brief and in no way convincing. Einhorn makes the positive statement that a benign cirrhosis of the stomach does occur. Osler recognizes the disease and reports one characteristic case. Hemmeter states that the pylorus may be the seat of a hypertrophic stenosis, and that in rare instances the entire stomach may be involved in such hypertrophic process. Leith recognizes the affection and discusses it at some length. He has observed one case, and mentioned a case seen by Dr. Clifford Allbutt.

Most German writers contend that a diffuse benign cirrhosis of the stomach does not occur. They maintain that all of these cases are carcinomatous. Bret and Paviot share the same opinion with the Germans. They state that their opinion is based on the condition of the perigastric glands in their cases. They admit that no evidence of carcinoma was found in the stomach walls themselves, but in the same case the lymphatic glands gave evidence of cancerous involvement. I am unable to find a detailed report of their cases, neither do I know the number they have reported.

G. B. Hunt reports an instance of diffuse carcinoma of the stomach, and is of the opinion that examples of diffuse thickening and contraction of the organ are malignant. He does not refer to any proof for his belief, with the exception of the report of one case.

From studying ten cases of cirrhosis of the stomach collected from the literature, and from observing a case operated upon by doing a gastroenterostomy, and who has remained well for thirty months, the opinion is reached that a benign diffuse cirrhosis of the stomach, though a rare condition, does occur. Of course, it is pos-

sible that a carcinomatous process may develop in a stomach already the seat of chronic cirrhotic changes, but, as will be seen from the pathology of the conditions that will be discussed later, it is improbable that such a case has been recorded.

From a study of the reported cases one would be led to believe that cirrhosis of the stomach was not associated with cancer in any way. Many writers do not concede this. Bret and Paviot are of the opinion that these cases are all malignant, but they give no proof for their statement. Mathieu believes that there is a close relation between cicatricial changes of the stomach and carcinoma. He says that, "Interstitial gastritis with atrophy is commonly associated with carcinoma. Interstitial gastritis and cancer go side by side or follow one another, just as in certain cases of primary cancer of the liver nodular carcinoma and cirrhosis develop simultaneously or successively." Mathieu's statements may be perfectly correct, but he brings no evidence that in certain cases cirrhosis of the stomach may be unassociated with malignant disease. It seems there are cases of cirrhosis of the stomach in which the conditions are sufficiently severe to terminate the life of the patient, and no carcinomatous involvement be present.

No doubt carcinomatous tissue might be present in some of the specimens that correspond, clinically and anatomically, to cirrhosis of the stomach. Such a case has been reported by Hunt. On the other hand, it is just as possible that cases similar to the one reported by Hunt were not malignant at all. The presence of glandular elements beneath the muscularis mucosa does not in itself mean carcinoma of the stomach. A quotation from Leuk is of interest in this connection,—“For an absolutely certain diagnosis of carcinoma from small pieces of stomach mucous membrane, we must prove an atypical epithelial proliferation from the mucosa into the submucosa. Glands in the submucosa even without mitotic figures must not necessarily be the result of carcinomatous proliferation. Accessory Brunner glands in the pylorus, or simply ends of glands that have been cut off by a branch of the hypertrophic muscularis mucosæ, as I have often seen it in complete sections, might simulate a carcinoma.”

It is difficult, or impossible, to diagnose a case of cirrhosis of the stomach. The condition might be suspected in a patient who presented symptoms of benign stenosis of the pylorus with a contracted stomach. It would be impossible, in any case, to exclude malignancy.

The following conditions would point to a cirrhosis of the stomach: (1) Long-standing disease. (2) Absence of vomiting of blood. (3) A contracted stomach. (4) Absence of a tumor on palpation. (5) Absence of glandular or hepatic involvement. (6) Improvement of the patient generally, and relief of the stomach symptoms for a considerable period of time when rectal feeding is resorted to.

The treatment of cirrhosis of the stomach is surgical. Patients suffering from cirrhosis of the stomach do not die until the pylorus has been so nearly closed as to prevent the passage of food into the intestines. If the condition is non-malignant, as we have reason to believe from the reports of cases, and especially in cases in which the gastric mucosa is found to be smooth, firm, and pale when the stomach is opened, gastroenterostomy should be performed. This operation drains the chronically inflamed stomach, and at the same time allows food to pass into the intestines.

ULCERS OF THE DUODENUM.

Ulcers of the first and second portions of the duodenum do not differ materially in their indications for operative treatment from ulcers of the stomach. These cases, perhaps, are more difficult to diagnose than are gastric ulcers, but demand the same consideration regarding the advisability of surgical operations, and the time at which the operation should be performed.

STRICTURE OF THE DUODENUM.

Stricture of the duodenum as a rule is the result of complications occurring in the course of gall-stone disease, or gastric or duodenal ulcerations. If these strictures are non-malignant and are producing serious symptoms, gastroenterostomy should be done.

CANCER OF THE DUODENUM.

Primary carcinoma of the duodenum is a rare condition, is so rapid in its progress, so difficult to diagnose, and so unsatisfactory to treat that little that is positive can be said at this time touching the indications for operative treatment, or the results that may be expected by resorting to surgical measures for this condition.

This disease has been studied extensively only during the last few years. From the reports of Fenwick, Perry and Shaw, Leuchtenstern, Whittier and Pic, and Brill, it is probable that one-twelfth of

one per cent. of deaths result from cancer of the duodenum, and that three per cent. of the intestinal cancers are found in the duodenum.

A study of fifty-one cases made by Fenwick shows that in seventy-five per cent. of these cases the carcinoma is located in the second portion; that the upper portion of the duodenum is next in frequency of involvement, and that carcinoma of the third portion very rarely occurs. For this reason it is probable that early operative treatment may produce a radical cure in some cases.

There is no means of making a diagnosis with any degree of positiveness. If the patient complains of general symptoms suggestive of carcinoma, and if digestive symptoms indicate the presence of a progressive or a surgical lesion in the duodenum, carcinoma might be expected, and exploratory operation should be advised. As these cases are rapid in their progress, terminating the life of the patient in seven months, according to Whittier and Pic, surgical treatment must be carried out at an early date if a permanent result is to be obtained.

At the present time the only operation that has been suggested to relieve these cases is gastroenterostomy as a palliative measure. Brill states that if the conditions are favorable and the affection recognized at a sufficiently early date, resection of the growth should be undertaken.

DISEASES OF THE PANCREAS.

At the present time the importance of the physiology and diseases of the pancreas are well known, but the nature of many of the pathologic conditions involving this organ remains undetermined. The recognition of pancreatic diseases is uncertain and the method of their treatment is a disputed question. The symptoms of diseases of the pancreas are by no means characteristic, and the diagnosis of all the pancreatic diseases is rarely, if ever, positive. No symptoms, or physical or chemical findings with the possible exception of glycerine in the urine studied and recognized by practically the tests for glycerose by Cammidge and Robson, indicate positively pancreatic disease. Although the whole subject of the pancreas is unsettled at present we can say, however, that diseases of this organ are always serious and many times fatal; that operative treatment for any of these conditions is always grave; that surgical treatment offers practically the only hope of giving relief; that an absolute diagnosis many

times cannot be made; that a probable diagnosis is sufficient to call for operative treatment; that inflammatory diseases of the organ are best treated by drainage, and that efficient drainage should be provided for in doing every operation that involves the pancreas.

Anomalies.—In two instances annular pancreas encircling the duodenum has been observed. If this condition could be recognized clinically, or observed during laparotomy, and was producing serious constriction of the intestine, gastroenterostomy would in all probability be indicated to relieve.

Injuries.—Injuries of the pancreas are the most serious that occur. On account of the anatomical location of the organ injuries are usually associated with damage to the surrounding tissues. For this reason an operation on the pancreas for the relief of injury will probably be performed on account of symptoms and findings that indicate operative measures for injuries to other organs of the upper abdominal region. If from the history and from the symptoms and clinical findings there is reason to strongly suspect an injury to the pancreas, operative measures should be advised at once. The great majority of pancreatic injuries result fatally if untreated surgically, while the results in those cases treated by operation are quite satisfactory. Mikulicz has collected nine cases of stab wounds involving the pancreas that were subjected to operation: recovery followed in eight of these. Operation is essential in subcutaneous injuries of the pancreas, as well as in open wounds involving the organ. Thirteen unoperated cases of subcutaneous injuries to the pancreas resulted fatally, while eleven similar cases treated by operation resulted in seven recoveries and only four deaths.

From the foregoing it will be seen that in all probability there is no question regarding the advisability of performing operations in cases in which there is reason to believe that the pancreas has received an injury. The operation in these cases will depend to a great extent upon the location of the traumatism, the associated injuries of other organs and the extent of the pancreatic wound, and the length of time that has elapsed before the operation is undertaken. Drainage is the most important factor in performing any of these operations. No operation for injury to the pancreas should be attempted unless efficient drainage is provided for. In some instances drainage is all that is required. Eight cases of pancreatic injury treated by simple drainage resulted in six recoveries and two deaths. The cases treated by

Rose, Mikulicz, Sterns, Lissjanski, Michailon, Cushing, Kuhlen and Kampf recovered with simple drainage only. In some of these, injury to the pancreas was quite extensive and in most of them the operation was performed shortly after the injury occurred. While it is possible that simple incision and drainage will be entirely sufficient in certain injuries to the pancreas, more extensive operative measures will in most instances be required and will be rewarded with better results. If there is extensive hemorrhage from the injured pancreas, suturing, ligation or clamping should be resorted to. If the organ is extensively lacerated suturing should be done to approximate the torn portions. Cuttner has sutured a completely divided pancreas and obtained a successful result. In these cases care should be taken in placing the sutures to avoid the pancreatic ducts. If an injury to the pancreas has been so extensive as to result in a partial prolapse of the organ, excision of the prolapsed portion, or replacement, is indicated. In seven of these cases excision of the prolapsed portion was resorted to in only two instances, while replacement was entirely sufficient in treating the remaining five. Removal of a seriously injured pancreas is never justifiable, and should not be resorted to. Posterior incision for the relief of these cases is probably not desirable. Many times an incision below the costal margin will be advisable after the injured organ has been inspected and treated through an anterior incision, but as a rule it is inadvisable to attempt repair through a posterior wound. It is unnecessary, of course, to state that early operations should be insisted upon in all injuries of the pancreas.

ACUTE PANCREATITIS.

Under the heading of acute pancreatitis we may consider, from the standpoint of indications for operative treatment, the hemorrhagic cases, those rapidly fatal cases in which the patient succumbs shortly after the primary collapse, those associated with gangrenous changes in the pancreas, and those that result in extensive fat necrosis in the pancreas and surrounding structures. No attempt will be made towards recognizing those cases that are primarily or secondarily dependent upon infection. The operative treatment for all cases of acute pancreatitis is at the present time in what may be called the experimental stage. Enough has been done in an experimental and clinical way, however, to show conclusively that surgical treatment offers the only hope of relief, in all but the very mild cases

of this disease, and that operative measures if carried out promptly and properly are fairly successful in these serious and sometimes rapidly fatal affections.

A proper understanding of the indications for operating upon cases of acute pancreatitis, and the choice of operation that should be performed, depends upon a thorough knowledge of the nature of the condition. The accepted theory to-day is that acute pancreatitis in all its varieties is at the beginning not dependent upon bacterial invasion, but is the result of mechanical conditions. It is believed that the great majority, if not all, cases are dependent upon a mechanical obstruction below the junction of the common hepatic duct and the pancreatic duct. It is believed by many, and there is considerable evidence both experimental and clinical in support of this belief, that biliary calculi in the great majority, if not all cases, are responsible for this mechanical occlusion of the ducts, and consequently are the prime factors in bringing about acute pancreatitis in any of its forms. A careful study of the work that has been done along these lines certainly indicates that closure of the orifices of these ducts, close to or at the duodenum, either by the presence of stone or by inflammatory swelling, is in all probability responsible for the occurrence of acute pancreatitis. Experimentally, Opie, Flexner, Pearse and Hewlett have shown that the injection of bile into the pancreatic duct is entirely capable of producing acute pancreatitis in all of its stages and varieties. The occurrence of fat necrosis is also produced by this experiment. These observations coincide with the work of Pawlow, who observed that bile increases the efficiency of the fat-splitting ferment of the pancreatic secretion. Clinically, a considerable number of cases have been observed which support the mechanical theory of the etiology of acute pancreatitis. Gall stones are found in most of these cases and in some of those in which no gall stones have been found, either at operation or autopsy, there is reason to believe that the stone had escaped into the duodenum a short time before the symptoms of pancreatic disease occurred. The presence of infection probably does not exist at the beginning in any form of acute pancreatitis. Pancreatitis, produced experimentally by Flexner, Opie, Hewlett and others, was found to be aseptic, although the condition existed in all stages of severity. Hlava has observed in a human being that the hemorrhagic exudate in cases of acute pancreatitis contained no micro-organisms.

It is probable that acute pancreatitis is dependent upon chemical changes; that the condition may be hemorrhagic or gangrenous, that fat necrosis occurs secondary to the primary changes in the pancreas itself, and that infection is always of a secondary character and is dependent upon an extension of the micro-organisms from the intestinal canal into the degenerated and infiltrated pancreatic tissue.

A consideration of the nature of acute pancreatitis, the seriousness of the condition and the mortality that occurs when not treated surgically, compared with the results obtained by operative treatment in all cases except those that are very mild in character and in which the diagnosis is doubtful, shows conclusively that surgery is positively indicated in all but the mildest instances. Operation should be done early in the course of the disease, as soon as the patient has recovered from the primary collapse that many times initiates this illness. The mortality from the cases subjected to operative treatment also impresses us with the desirability of operating upon these patients. Seventy-eight cases of acute pancreatitis operated upon resulted in twenty-nine recoveries. This, in all probability, does not represent fairly the mortality rate that may be expected if operations for acute pancreatitis are performed systematically and properly and only by those of large experience. There is no question at the present time but that the operative treatment is the treatment of choice in all serious, acute cases of pancreatitis.

From the reported cases and the advice of those who have given this subject careful consideration, the operation of choice in all cases of acute pancreatitis should in all probability be laparotomy in the upper abdominal region, followed by exposure and incision of the pancreas, and efficient drainage, either through the abdominal incision or through a posterior counter opening. The reported operated cases show conclusively that operations for acute pancreatitis offer the best results when the organ is itself attacked. Mikulicz has collected thirty-seven of these cases, showing twenty-five recoveries. This is certainly a remarkable record and speaks strongly in favor of the operation that attacks the pancreas. It seems probable that direct incision of the pancreas to relieve tension and provide drainage is positively indicated in treating acute pancreatitis. This operation was first suggested by Minier. It is recommended by Mikulicz, and has been practised successfully in one case by Porter, of Boston.

It is true that operations that do not attack the structure of the

pancreas are sometimes sufficient to secure successful results in cases of acute pancreatitis. Hahn and Woosley recommend that laparotomy and drainage, down to the pancreas, be done in preference to more extensive operative measures. Hahn, Halstead, Pels-Leusllen, and Henle have practised this method and speak favorably of it. The reports of the operated cases, however, suggest that simple incision and drainage down to the gland are not as efficient in dealing with acute pancreatitis as incision into the gland itself. Forty-one cases operated upon by simple drainage resulted in only four recoveries.

SUPPURATIVE PANCREATITIS.

Suppurative inflammations of the pancreas present indications for operative treatment in all cases. Operations for the relief of localized collections of pus in the pancreas were suggested by Senn in 1889, and later recommended by Fitz, Sentz and Minier. The first successful operations for the relief of pancreatic suppuration were done by Thayer and by Körte. If an acute pancreatitis becomes sub-acute or chronic and results in abscess formation, or if the probability of a primary pancreatic abscess is determined, operation should be advised at once. The abscess may be attacked through an anterior, or preferably through a posterior, incision. Efficient drainage should be provided for and care should be taken against infecting the general peritoneal cavity.

Abscesses in the pancreas that occur secondary to suppurative foci in other portions of the body have been studied by Thierfelder and Chiari, and present positive indications for surgical treatment as soon as the diagnosis is made.

CHRONIC PANCREATITIS.

Chronic pancreatitis in almost every instance is dependent upon the presence of gall stones. It is usually not extremely difficult to diagnose and has been efficiently treated by drainage of the gall bladder. Robson has collected a large number of cases of chronic pancreatitis that have been treated successfully by cholecystostomy. This, in all probability, should be the method of choice in dealing with chronic inflammations of the pancreas. Cholecystenterostomy, either into the duodenum or into the colon, has been recommended and practised with success in treating these cases. It is probable that simple cholecystostomy will be found applicable in the great majority of these cases. The operation is very rapidly done, and does not pre-

sent the danger of infection of the biliary apparatus from the intestines. There are certain operators, however, among them Chambers and Friedenwald, who prefer an anastomosis between the gall bladder and intestine in treating cases of chronic pancreatitis. Of course in doing this operation gall stones in the common duct, or in the diverticulum of Vater, should be removed if possible.

TUBERCULOSIS.

Tuberculosis of the pancreas has been observed in a few instances. The symptoms are indefinite in character, and the diagnosis probably impossible. Sender has removed successfully a tuberculous mass involving the pancreas. It is probable that certain cases of localized tuberculosis of the pancreas present an indication for operative treatment, but the condition is so rare, and its diagnosis so difficult, that no positive statements can be made at the present time regarding the occurrence of tuberculosis of the pancreas, or the best method of treating it.

SYPHILIS.

Syphilis of the pancreas should always be given consideration when chronic pancreatitis is suspected. The symptoms of syphilitic involvement in this organ are not unlike those of chronic inflammations resulting from obstruction. No operation should be performed in cases of syphilitic involvement of the pancreas, and if there is reason to believe that the condition from which the patient suffers might be syphilitic, anti-syphilitic treatment should precede operative measures. Derozdon has observed a case of syphilitic involvement of the pancreas in a patient thirty-four years of age. This patient was satisfactorily treated by internal medication.

PANCREATIC CALCULI.

Pancreatic calculi are treated successfully only by surgical means. It is probable that a diagnosis of this condition has been made in five or six cases, but only a very small number of operations have been performed with the idea of removing a pancreatic calculi. Pearce Gould operated for the relief of a stone in the pancreatic duct, with a fatal result. There is one case, however, in which a pancreatic calculus has been correctly diagnosed, and removed successfully. This occurred in the practice of Moynihan.

PANCREATIC CYSTS.

Cysts of the pancreas present a positive indication for surgical treatment in all cases. If there is reason to believe from the symptoms present, from the history of the case and from the findings on examination that there exists a cyst of the pancreas operation should be advised and performed without delay. This applies to all forms of cystic involvement of the organ. The classifications of Körte, Fitz and Robson are of value from the standpoint of etiology and diagnosis, but are not to be considered in advising operative treatment.

Since Gussenbauer, in 1882, first successfully treated cysts of the pancreas these operations have been performed in considerable numbers and with encouraging results. At the present time the mortality of operations performed for the relief of cysts of the pancreas is estimated by Woosley as being four per cent. The operation of choice in these cases in my opinion should consist of drainage only, at the primary operation. McArthur makes the statement that all cysts of the pancreas that can be shown clearly to be due to retention present an indication for drainage, while all other cystic growths should be excised. While it is probably true that excision is the best method of treatment for certain congenital cystic tumors and cystic adenomas, these cases are comparatively rare and can be treated advantageously by drainage. Complete excision, if necessary, can be performed at a secondary operation. While excision of a cystic growth is not a serious operation, as has been shown by the reports of Ransahoff, who announced a mortality of only two in twenty-three operated cases, this operation is more difficult to perform and in all probability has a greater mortality than simple drainage of these cystic growths. Complete excision should not be done at the primary operation unless the patient is in very good condition, and it can be positively determined that the cyst is not the result of trauma or of local inflammatory conditions, and is not a true retention cyst.

SOLID TUMORS OF THE PANCREAS.

Benign and malignant tumors, situated in the body or the tail of the pancreas, give us a positive indication for operative treatment. The mortality of this operation is high and has been estimated by Mikulicz as being fifty per cent. Nevertheless, as the great majority of these cases are malignant, operation for their removal should be undertaken. Carcinoma of the head of the pancreas, in the great

majority of instances, presents an indication for palliative treatment only. Drainage of the gall bladder, either to the surface or into the intestine, will give these patients temporary relief and should be done in all cases unless there is an attempt made to remove the entire growth. Removal of the entire pancreas, suggested by Gussenbauer and Senn, is probably an unjustifiable operation. This operation has been done in three instances with varying degrees of success. Ruggi and Grade removed the pancreas and their patient survived the operation. Franke has reported a remarkable case in which he removed the entire pancreas for a carcinoma and the patient survived nearly six months without glycosuria and other symptoms that are supposed to be characteristic of absence, or disease, of the pancreas. While it is possible that occasionally a removal of a carcinoma in the head of the pancreas may be accomplished successfully, it is doubtful if these operations will ever become popular, and it is doubtful, also, if these tumors can be recognized and operated upon sufficiently early to make such an operation justifiable.

Although, at the present time, we are justified in advising surgical treatment for almost every disease of the pancreas, indications for operation, the operative technic, and the extensiveness of the procedure are by no means settled. At the present time there is only one statement that can be safely made regarding operations upon the pancreas, whether done for tumors, inflammatory conditions or new growths. This statement concerns drainage. No operation down to or into the pancreas should ever be performed without securing efficient drainage. We should never neglect to thoroughly drain the wound in any case in which the pancreas has been exposed, much less when incisions are made into the pancreatic tissue, or when injuries of the organ have been repaired.

X. THE LOWER ABDOMINAL REGION.

APPENDICITIS.

The cases of appendicitis most dangerous to the patient, and most difficult to treat properly, are those in which the inflammatory process has extended beyond the walls of the appendix, in which there is no reason to believe that Nature is walling off infection, or arresting its progressive extension. Pathologically the infection has spread to the surrounding peritoneum and may have involved the entire peritoneal cavity. Adhesions are not present, and no localized collections of pus are found. Clinically, these patients are in a critical condition. They have been sick usually from two to five days; they show marked general symptoms of toxemia, with local findings that strongly suggest a general peritonitis. They are in a hazardous condition, and the method of treating them is undetermined. Appendicitis, in this stage, is extremely dangerous, and, too often, impresses even experts with the fact that they are not masters of the situation regarding the indications for treatment.

We may, for the sake of brevity and for want of a better term, designate these dangerous and uncertain cases as "precarious cases of appendicitis," or "appendicitis in a precarious stage."

The treatment is well settled in all cases except those in a *precarious* stage. There is no question that operation is positively indicated if the infection has not spread beyond the walls of the appendix. It is also generally admitted that operative treatment is positively indicated in all cases in which localized suppuration has occurred. Such treatment of appendicitis, limited within the walls of the appendix, or localized by the structures of the peritoneal cavity, is, unquestionably, a safe and certain procedure; and there is no reason to believe that anyone to-day would consider anything but the operative treatment. The conditions are quite different, however, in treating *precarious* cases of appendicitis. To-day, there are two recognized methods of dealing with these patients: One, the non-operative, recommended by Ochsner and others, which consists in relying upon the resistance of the patient to localize the infective process; the other, advocated and practised by Murphy and many others, may be designated the operative method. These latter advise immediate operation in all precarious cases of appendicitis. A careful study of

the reported cases of those who practise one method exclusively, or who have given both quite a fair and extensive trial, by no means convinces one that either method should be employed in treating all cases. One's personal experience is quite as indefinite as the reported cases of others, leading to the belief that neither of these methods has solved the problem for treatment in the precarious stage, and that we cannot advise, for all of these patients, either the operative or the non-operative course.

The advantages of the non-operative method are that the limiting powers of the peritoneum are not interfered with; that infection is not disseminated mechanically; and that the patient is not subjected to the shock of anesthesia or operation. The dangers of this method are that many times the infection is so virulent that nature cannot limit its extension, and the patient succumbs.

The advantages of the operative method are, drainage at the seat of infection and removal of the primary focus. This, in all probability, does much to limit the extension of the infective process. The dangers of this method are that in attacking the appendix through an anterior incision more or less risk of dissemination of infected material is incurred. This is not only true at the time the operation is performed, but is true during drainage of the infected area through the field occupied by the small intestines.

As said before, it is impossible to assert that any one method is more effective than the other in treating all patients. It is probable that each has a certain field of usefulness, and that neither completely solves the problem.

(In the *Annals of Surgery*, September, 1904, under the title of "A Posterior Incision in Certain Appendicitis Operations," I described and recommended an incision that up to that time I had practised with satisfaction, and that, in my hands, has proved a very efficient method in precarious cases of appendicitis. The operation that I described at that time was made as follows:

"The appendix is reached through Petit's triangle. A vertical incision is made along the outer border of the latissimus dorsi, and extends from the crest of the ilium upward. This exposes the outer border of the quadratus lumborum and the lumbar fascia and aponeurosis of the transversalis, which extends anteriorly from the outer border of the muscle. The second incision is made transversely, close to the iliac crest, through the lumbar fascia and transversalis, expos-

ing the parietal peritoneum directly over the ascending colon and cecum."

Theoretically, operation through this incision for appendicitis during the precarious stage, accomplishes the object of those who advocate the operative method; that is, it efficiently drains the infected area, and at the same time does away with the most important risk incurred by operating through an anterior incision. The appendix is attacked through the posterior incision, without interfering with the small intestines, without a chance of disseminating the infection, and without destroying adhesions, if any are present. It drains with the aid of gravity, drains in the most dependent part, and does not drain through important structures. This procedure meets all the indications of the operative method more efficiently than does an operation through an anterior incision, and at the same time reduces to a minimum the dangers attending the operative treatment in precarious cases. On the other hand it offers no serious objection to the thorough carrying out of the rest, or non-operative method. As the small intestines have not been interfered with there is no reason why the non-operative method should not be as efficient in assisting nature in limiting the infection, with a posterior incision for drainage, as it would be if no incision had been made.

I have obtained very satisfactory results indeed by subjecting all precarious cases of appendicitis to a posterior incision, removal of the appendix and drainage, and at the same time employing the rest treatment, with gastric lavage and rectal feeding. Since I have used this method I have treated only nine patients with appendicitis that could truly be said to be in the precarious stage. Four were in a very serious condition. There were local and general findings that suggested involvement of the entire peritoneum. All, however, made a rapid and complete recovery.

I do not claim that this incision solves the problem of treatment in precarious cases of appendicitis; neither do I claim that it puts the treatment on as definite a footing as when the condition is limited to the appendix, or when localized suppuration is present. I do believe, however, that the method is more efficient in these hazardous cases than is operative treatment done through an anterior incision, or the non-operative treatment, without drainage, during this stage. From theoretic considerations and from practical observations, I feel justified in recommending the posterior operation in cer-

tain cases of appendicitis, and especially in those that may properly be called *precarious*.)

ACUTE APPENDICITIS.

It appears logical to hold that the treatment of an acute attack of appendicitis, at its beginning, is surgical. The very early operative treatment is unquestionably the safest method. On account of the well known mortality of appendicitis when treated medically, and owing to the fact that the symptoms of an acute attack of appendicitis are, almost without exception, constant in their occurrence and characteristic of the disease, there is no legitimate excuse for not offering operative treatment in these early cases. The fact that the majority of patients suffering from an acute attack of appendicitis will not die if untreated, and the fact that many are, without good reason, prejudiced against operative treatment, offer no excuse to the physician or surgeon for not stating in an unmistakable way, the mortality of appendicitis; which, of course, indicates the line of treatment that is most conservative.

If it is impossible or inadvisable to operate, or if the patient refuses operative treatment at the beginning of the disease, there are a few symptoms and findings that, to a certain extent, suggest the seriousness of the particular case and the probable outcome of the acute attack. Pronounced symptoms of intoxication, as a violent chill, marked elevation of pulse and temperature, initiating an acute attack of appendicitis as a rule indicate a serious condition. The intensity of the primary symptoms, however, cannot be relied upon in making a prognosis or in advising treatment.

Severe primary symptoms associated with a marked and rather sudden decline both in the local symptoms and in the general symptoms of intoxication, point strongly in favor of advising immediate surgical treatment. This early and temporary cessation, or marked amelioration, of symptoms in almost every instance means a necrosis of tissue resulting in diminished absorption, rather than a resolution of the inflammatory process.

A gradual cessation of symptoms beginning forty-eight hours after the onset of the disease, occurring in a patient whose initial symptoms were mild or only moderately severe, suggests a favorable outcome of the acute attack without surgical intervention.

There are many exceptions to the foregoing somewhat indefinite

and more or less general statements. It is impossible many times to know the pathological conditions in an acute attack of appendicitis from the symptoms or findings of the case. The man who believes that it is possible to know, in all instances, the existing local conditions without exposing them has, in all probability, not come in contact with certain cases of acute appendicitis that are not only exceptions to the rule, but offer complete surprises to the experienced operator when an incision is made. On account of the treacherous nature of certain cases of appendicitis one is justified in advising all patients that the very early operative treatment is the most satisfactory method of all in acute appendicitis.

LOCALIZED SUPPURATION.

Operative treatment is indicated, if a localized abscess has resulted from an acute attack of appendicitis. Operations for this condition are usually satisfactory procedures. Drainage meets the immediate indications. The appendix should be removed when performing this operation, if it is found possible to do so without markedly interfering with adhesions, or without producing injury to the intestines. No irrigation is permissible in draining these localized collections of pus.

CHRONIC APPENDICITIS.

Definite symptoms indicating a chronic inflammation of the appendix following a well-defined acute attack, offer distinct indications for operative treatment.

Chronic abdominal symptoms, with or without paroxysmal attacks of pain, unassociated with definite gall bladder or stomach symptoms, and with decided constant or periodic tenderness over the appendix, present a positive indication for operation.

It is difficult or impossible to give the indications for operative treatment in all cases of appendicitis that afford no history of a primary acute attack. There is no question but that an appendicitis does exist and produce definite and distressing symptoms in a patient who has never complained of symptoms that correspond to an acute attack of the disease. If a patient complains of occasional, paroxysmal, abdominal pains, associated with, or followed by, tenderness over the appendix, an operation is indicated if the symptoms are of long standing and are not diminishing in severity.

A chronic appendicitis is occasionally responsible for obscure ab-

dominal symptoms that may be continuous or intermittent. These patients complain of more or less abdominal pain; distension is not uncommon; constipation is the rule; and neurasthenia is frequently met with if the condition has been of long existence. If, in these cases, a decided point of tenderness is found over the region of the appendix, and no other affection can be made out to be the cause of the symptoms, removal of the appendix is indicated. I have operated a large number of these patients and have invariably found definite, and sometimes marked, pathologic changes in the appendix. The results following operation for these patients are satisfactory. Of course, care must be taken that a primary neurasthenia does not lead to erroneous diagnosis, or that pathologic conditions in organs other than the appendix are not overlooked. One should bear in mind that long-standing abdominal symptoms, associated with constipation and often neurasthenia may be dependent upon a chronic appendicitis, and that the patient may not have necessarily suffered from an acute attack.

Periodic symptoms indicating an affection of the colon may be occasionally due to a chronic appendicitis. Continuous or periodic diarrhea or quite characteristic mucous colitis may depend upon a chronic inflammation of the appendix. In these cases I have found decided tenderness over the appendix and on operating have found an inflammation in the appendix, which was cone-shaped, and allowed inflammatory products to drain readily into the cecum.

APPENDICITIS AND PREGNANCY.

The indications for operation in the acute serious cases of appendicitis are the same in pregnant and non-pregnant patients. The operation, however, on pregnant patients offers increased dangers both to the mother and to the child. Pinard reported thirty operations for appendicitis in pregnant women, with a maternal mortality of thirty-three per cent. and a mortality to the child of thirty-six per cent.

An operation for chronic appendicitis should not be performed on a pregnant woman. Neither should the mild, acute cases be treated by operation during pregnancy. Operation should be the treatment of necessity, not of choice, in appendicitis associated with pregnancy.

CARCINOMA OF THE CECUM.

Cancer of the cecum can be treated successfully only by operative measures. In the early stages of the disease radical removal of the tumor is indicated, while in the later and advanced stages palliative surgical measures will many times give temporary relief.

On account of the fact that carcinoma of the cecum is more latent in producing symptoms in the beginning of its course, on account of the fact that these growths often are painless until they are far advanced, and owing to the difficulty of recognizing these tumors and the inconstancy of the symptoms that they produce or the combinations of symptoms that are associated with them, early operative treatment is rarely resorted to. Many times these tumors run a comparatively painless course; hemorrhage is by no means a common symptom; the dyspeptic symptoms are indefinite and not of great value from a diagnostic standpoint, while the presence of the tumor frequently cannot be located until the disease has advanced beyond the stage that renders radical treatment possible. Exploratory incision should be done in all cases in which the patient shows a general but gradual wasting, with more or less indefinite intestinal symptoms and with marked resistance or with slight tenderness in the right iliac fossa. It is not necessary that a growth should be palpated before a provisional diagnosis of a tumor of the cecum can be made. If there is reason, from the presence of pain, symptoms of dyspepsia, a slight point of tenderness and the general wasting of the patient, to believe that a carcinoma of the cecum might be present exploratory laparotomy should be advised at once. It is probable that in a combination of these symptoms a surgical condition is present, and if a malignant growth is the cause of the symptoms early operation gives the only chance of relieving the patient.

If a laparotomy is done while the disease is in the beginning stages complete removal of the growth should be accomplished. The majority of operators doubtless prefer closure of the ends of the intestine, followed by a lateral anastomosis. This operation can be effected at one sitting if the disease is recognized early and the patient's general condition good. If the disease is well advanced at the time the operation is performed, and the patient's general state has been materially affected by the malignant growth, it is probable that a lateral entero-anastomosis, with extra-peritoneal exclusion of

the tumor, should only be done at the first operation. As soon as the patient's condition will permit the growth may be removed. I am of the opinion that operations of this character are indicated in malignant disease of the cecum that is well advanced. The existence of enlarged glands in the region does not in all cases contraindicate the performance of this operation. Many times these glands can be removed, and if carcinomatous glands have remained it is probable that the patient will live longer after being subjected to a radical removal than if only a palliative operation is done. When we consider that all of these growths rapidly terminate life if not removed we are justified in attempting the radical operation even in the more advanced cases. If the disease has reached a stage that renders the radical removal unadvisable, palliative operation by making an intestinal anastomosis, or an artificial anus, will many times be indicated. Distressing symptoms are relieved by these palliative operations and the patient's life often prolonged. At the present time we are unable to recognize carcinoma by any definite symptoms, or train of symptoms, therefore we are correct in advising early exploratory operation in all cases of suspected carcinoma of the internal organs. This is especially true in carcinoma of the cecum, as frequently the disease is well advanced before pain or local symptoms are complained of, or before the tumor can be detected by physical examination, or even a point of tenderness made out over the growth.

CARCINOMA OF THE COLON AND SIGMOID FLEXURE.

The existence of a malignant growth involving the large intestine presents an indication for radical or palliative operative treatment. Definite obstructive symptoms, or the palpation of the growth, should not be waited for in these cases before operation is advised. If the symptoms and findings are suggestive of the presence of a malignant tumor of the large intestine, and the symptoms are progressing, exploration is advisable. Many times these tumors develop slowly, and an early diagnosis is difficult if not impossible. For these reasons, and on account of the fact that early operation offers the only hope for curing these patients, laparotomy is justifiable in all cases in which there is reason to suspect primary, malignant disease of the intestines.

The character and extent of the operation that is necessary to

relieve these patients can be determined only after the abdominal cavity has been opened.

Non-malignant stricture of the large intestine can be treated successfully only by surgery. Operation is indicated as soon as the stricture is recognized. The character or extent of the operation that is required cannot, as a rule, be determined before the intestines have been exposed.

INTUSSUSCEPTION.

This is a mechanical condition and can be treated successfully only by mechanical means. In dealing with these cases at their beginning it is advisable to attempt to reduce the intussusception by forcing gas or liquid into the rectum. These means fail in probably seventy-five per cent. of the cases, and a prolonged trial of them should be condemned. If an intussusception has existed for some time, or if a recent intussusception is not readily relieved by non-operative methods, immediate laparotomy is called for. Delay in operating is responsible for the mortality in this affection.

VOLVULUS.

A volvulus that produces complete intestinal obstruction indicates early operation if the twist cannot be quickly relieved by rectal insufflation. Hydrostatic treatment will rarely be efficient if the symptoms of intestinal obstruction are well defined; and it should never be undertaken if there is reason to believe that the volvulus has existed for a number of hours. Early laparotomy is the treatment of choice whenever a volvulus that is sufficiently marked to obstruct the bowel can be diagnosed. If the operation is done before the affected portion of the intestine has lost its vitality, mechanical replacement of the twisted portion of the intestine will meet the immediate requirements. If the sigmoid flexure is the seat of the volvulus, which is so often the case, sigmoidopexy should be performed to prevent a recurrence of the twist. In doing this operation the sigmoid should be attached to the transversalis fascia, and not to the parietal peritoneum.

Cases are occasionally met with that present symptoms of temporary recurring attacks that in all probability depend upon a twist in the sigmoid flexure that produces temporary obstruction which is relieved spontaneously. These symptoms, as a rule, extend over a considerable period of time. They are, nevertheless, constant in their

characteristics and gradually progress in severity. An inflammatory process resulting in thickening and increased weight of the mesosigmoid has been observed in these cases, and is doubtless responsible for the occurrence of temporary volvulus in some of these patients. If these symptoms are progressing in severity and markedly inconvenience the patient, operation is indicated. Sigmoidopexy should be the operation of choice. The fixing of the sigmoid prevents the recurrence of the volvulus, and if mesosigmoiditis is present it places the inflamed parts in a position that permits of no interference with the circulation of the inflamed area and, for these reasons, offers the best possible chance for a resolution of the inflammatory process. A few of these cases have been subjected to operative treatment. The results have been satisfactory.

CHRONIC COLITIS.

The medical and local treatment of chronic and severe inflammations of the large intestine are very unsatisfactory; often the most efficient of such methods do not give the patient more than temporary relief. These cases are so distressing to the patient, are so exhausting to his general condition, and are so resistant to non-operative methods, that we are justified in resorting to surgical measures. The results following operative treatment for chronic inflammations of the large bowel, including tuberculosis and chronic dysentery, have been so universally satisfactory that we are not only warranted but logically compelled, to advise surgical treatment in all of these cases that are of long standing, and that resist less radical measures. So far as I am able to determine there are no recorded cases of failure following properly done operations to relieve these chronic and severe inflammations and ulcerations of the colon.

Not all chronic inflammatory conditions involving the large bowel should be subjected to operative treatment. Chronic dysentery due to infection of the ameba coli, or other organisms; chronic, local or diffuse ulcerative, or non-ulcerative conditions; and possibly tuberculous involvements of the large intestines, present the most usual demands for surgical interference. These cases should not be placed under operative treatment at all until local and medicinal measures have been given a prolonged trial; but if this has been done, without material benefit to the patient, we are then right in advising operation. Operation for these patients should not be consid-

ered seriously and should not be unduly delayed. If it can be determined that the pathologic condition resists local and medical treatment, operation should be performed at once. There are no plausible excuses for delaying surgical treatment in these cases until the long-standing and severe disease has rendered the patient's condition critical. The chronic inflammations of the colon, enumerated above as presenting indications for operative treatment, do not include the obscure condition commonly known as the muco-membranous colitis. This will be discussed in another chapter.

Although it has been shown that the operative treatment for many chronic inflammatory conditions of the large intestine has been followed by very satisfactory results, operations of this character should not be advised indiscriminately, and no patient should be subjected to an operation for a chronic inflammatory or ulcerative condition of the large bowel unless it can be positively determined that the disease of the colon is a primary condition, and is not secondary or dependent upon some local or general grave affection. Ulcerations and inflammatory conditions resulting from malignant disease of the large bowel present a positive contraindication to the performance of the operation ordinarily advised to relieve chronic dysentery, or other inflammatory diseases of the colon. Chronic colitis resulting from amyloid degeneration of the large intestine is a positive contraindication to operative treatment. The same is true of the great majority of syphilitic inflammations and ulcerations involving the lower portion of the intestines. The operation of iliac colostomy should not be performed to relieve symptomatic involvements of the colon, that are secondary to inflammatory conditions outside of the large intestine.

Retroperitoneal inflammatory conditions or tumors, or intra-peritoneal inflammations or adhesions, may produce a chronic inflammation of the colon, with long-standing symptoms of colitis. These patients require surgical treatment but the operation should attack the pathologic condition outside of the large intestine, and should not be performed with the idea of giving the colon a rest, or of affording the means for its irrigation and medication. The chronic inflammation of the colon usually disappears spontaneously when these underlying pathologic conditions are removed.

Another disease that is rare, but that cannot be overlooked, is inflammation of the mesosigmoid. A chronic mesosigmoiditis will

produce symptoms that cannot be distinguished from those of a chronic colitis. A right-sided colostomy should not be advised if a chronic inflammation in the mesosigmoid is suspected as the cause of the colon symptoms.

There are certain general diseases that must always be looked for, and if present, be given serious attention, before advising the performance of an operation for the relief of chronic inflammatory conditions of the colon. Chronic Bright's disease may be responsible for the inflammatory and ulcerative condition of the bowel, and if this is the case it is usually inadvisable to operate on the patient. While very likely the operation would be followed by temporary relief, yet the condition of these patients is so serious that it is probable the nephritis would be in such an advanced stage that the possible relief would not justify the risk incurred by the patient in the operation. Furthermore, it has been my experience that a chronic inflammation of the kidneys sufficiently severe to produce an ulcerative condition of the intestine, will usually terminate the life of the patient in a comparatively short time. There appears to be no legitimate indication for an operation for the relief of inflammatory conditions in the bowels that are dependent entirely upon advanced renal changes.

Tuberculosis of the large intestine, associated with advanced tuberculous changes in other parts of the body, usually presents a positive contraindication for operative treatment. Little can be gained by subjecting these patients to a surgical operation, and the opinion is expressed that it is good practice to refuse them operative treatment.

Operation of Choice.—There are two surgical procedures worthy of consideration that can be performed for the relief of chronic inflammatory conditions of the large intestine. An artificial anus made into the cecum meets the indication fully but has certain disadvantages. This operation gives the large intestine complete rest, prevents the passage over its mucosa of fecal matter, and allows irrigation and medication of the large intestine to be carried out; the disadvantages are that it greatly inconveniences the patient, and that many times secondary operations are required to close the fistulous opening. The procedure, however, is an efficient one and can be relied upon to produce a cure in the great majority, if not all, of these chronic and serious cases.

The operation for the relief of chronic inflammations of the

colon that seems to have the preference to-day is a simple right inguinal colostomy or the operation advised by Wier, which utilizes the appendix for irrigating the large bowel. The disadvantages of this operation are that the large intestine is not given complete rest, and that the contents of the bowel pass through the colon. On the other hand it has its advantages, and from the reported cases seems to be entirely sufficient to secure a permanent and satisfactory result. The operation is not a serious one to perform, especially when Wier's method is employed. The bowel can be efficiently irrigated and medicated and the fistulous opening can be closed without resorting to general anesthesia, and without performing any secondary operation. The opinion is given that the operation advised by Wier, or the operation recommended and practised by Gibson and others, will meet the indication in chronic inflammatory conditions of the colon, and that most of these patients should be subjected to operative treatment at a rather early stage of the disease.

XI. THE PERITONEUM AND SMALL INTESTINES.

INJURIES OF THE ABDOMEN.

The indication for operative treatment in all injuries of the abdomen depends upon the ability to diagnose the extent of the damage to the internal organs. If there is reason to believe from the history of the traumatism, from the manner of occurrence, from the location of the external wound, if one exists, or from the history of the symptoms, and the findings on examination, that internal hemorrhage has occurred, or that rupture of an abdominal organ has resulted, operation should be done at once, provided the patient is not moribund. In gunshot or stab wounds of the abdomen, or in any case of injury in which the abdominal walls have been penetrated, operation should be done at once. It is impossible to say, in dealing with certain gunshot injuries, that the bullet has or has not entered the abdominal cavity. If we are in doubt the practice should be to operate, provided the case is seen immediately after the injury has happened. If the shock from a penetrating wound of the abdomen has been severe, is prolonged and is associated with symptoms that indicate the loss of blood, operation is certainly indicated.

It is impossible at the present time to diagnose, with any degree of positiveness, perforation of the intestine or of the other hollow viscera of the abdomen. The presence of shock, or the degree of shock, is not a certain indication in these cases. The absence of shock speaks against perforation but by no means excludes it. The presence of pronounced shock, associated with marked abdominal rigidity, is strongly in favor of perforation and demands operation.

The absence of liver flatness is a positive indication for operative treatment. The fact that the liver area remains flat does not exclude perforation and does not speak for or against operative treatment. The use of hydrogen gas, and other gases, to demonstrate the existence of an intestinal perforation is not always positive and is by no means free from danger. Many times it is impossible to apply this test and as a rule its findings are not sufficiently conclusive to warrant us in making use of it as a diagnostic aid.

The operation in these cases should in most instances consist of

a median laparotomy, regardless of the position of the abdominal wound. Perforations should be systematically sought for and treated by suturing or by resection. The abdominal cavity should then be thoroughly cleansed, preferably by sterile solutions. It is not necessary that all of these cases should be drained, but it is a safe custom to provide efficient drainage in all such injuries. As a rule little is to be lost by draining these cases for a short period of time and occasionally it may aid materially in preventing or overcoming peritoneal infection. A discussion of the results obtained by operative and non-operative treatment for perforating wounds of the abdomen is of little value. The result will depend upon the extent of the injury, the general condition of the patient, the time that the operation is performed, the rapidity with which the operation is done and the condition of the intestinal contents at the time the injury occurred. There is no question to-day but that early operative treatment is positively indicated in all penetrating wounds of the abdomen associated with severe hemorrhage or with perforation of the hollow viscera.

SUBCUTANEOUS INJURIES OF THE ABDOMEN.

Subcutaneous, severe injuries of the abdomen are most difficult to treat properly. There are no signs or symptoms of extensive injury to the viscera, that are absolutely reliable, and there are few if any, symptoms that point to the method of treatment to be pursued. It is sufficient to say in this connection that if a reasonable doubt is present regarding the occurrence of perforation, or of acute hemorrhage, laparotomy should be done at once. If the operation has been unnecessary, it is not extremely dangerous to the patient and has not materially affected his chance of recovery. On the other hand if it is found after the abdomen is opened, that perforation is present or that bleeding is taking place, the operation that at the beginning was exploratory, will in all probability result in saving the life of the individual. When we consider that many of these apparently insignificant injuries are associated with grave internal damage, and that early operation offers practically the only hope of rescuing these patients, we shall not hesitate to perform laparotomy in all cases in which there is reason to believe that a perforation or serious hemorrhage might be present.

There are few symptoms or findings that can be relied upon in

making a diagnosis of the extent of these injuries. It is true that perforation of the intestine occurs most often in injuries in which the striking surface has been small and the velocity great. It is also true that perhaps eighty-five per cent. of these cases show profound shock if intestinal rupture is present. The occurrence of shock, however, and its intensity and duration, cannot be relied upon in determining the extent of the injury. Rigidity of the abdominal muscles, especially in that portion of the abdomen not directly injured, speaks strongly in favor of a serious internal abdominal injury. Marked and continuous abdominal rigidity, associated with a considerable degree of shock, presents, in my mind, an indication for operation. The absence of liver dullness may or may not be present in cases of subcutaneous perforation of the intestine. As a rule if it is present it points sufficiently towards rupture of the hollow viscera of the abdomen to warrant laparotomy. In all of these subcutaneous injuries general symptoms pointing to excessive loss of blood demand operative treatment. When it is considered that subcutaneous rupture of the intestine is not an uncommon condition, that in many cases we are unable to recognize the extent of the injury before laparotomy is done, and that all of these cases die if a perforation is present and if surgical treatment is not resorted to, we are entirely justified in advising operation in all doubtful cases of injury to the abdominal walls. In these cases of injury the use of gas to assist in making a diagnosis is not to be recommended. It is also true that activity of the abdominal organs does not exclude serious injury. Cases of intestinal perforation have been reported in which the patient had apparently normal evacuations of the bowels.

It is not one symptom or finding that should be relied upon as an indication for operation, but a sum-total of all the points pertaining to the case that should guide one in determining the treatment.

The operation in these cases should consist of a median laparotomy, repair of the perforations, cleansing of the abdominal cavity, and drainage in most instances. One should never be satisfied with repairing one wound in cases of subcutaneous injury. Kopfstein found six perforations in the intestinal canal following a subcutaneous injury. The existence of multiple ruptures in the intestine should never be lost sight of in operating upon these patients.

TYPHOID PERFORATION OF THE INTESTINE.

As a rule perforation of the intestinal tract during typhoid fever presents a positive indication for operative treatment. There is no question that the operative treatment offers the best chance of recovery for these patients, and from the reported cases and statistics showing the frequency of death from perforation there is reason to believe that these cases have not in the past, and are not at the present time, being treated properly. It has been estimated by Vaughan that fifteen thousand people die from typhoid perforation in the United States every year. In 1903, Frank was able to collect only 352 cases operated on in the entire world. These reports show conclusively that typhoid perforation is a not infrequent condition, that it is responsible for a large number of deaths, and that the majority of these patients have not been given the best opportunity for recovery.

A consideration of the mortality of perforation of the intestine during typhoid fever shows conclusively that the operative treatment should be the treatment of choice. It is generally believed that without operation ninety-five per cent. will die; that the great majority, if not all, of the cases in which the perforation occurs in the ileum will succumb unless treated surgically. It is believed that perforation in the appendix or in the cecum during the course of typhoid fever can occasionally result in spontaneous recovery. These cases are exceptions to the rule and do not in any way modify the indications for surgical treatment.

On the other hand the results that have followed operative treatment are encouraging. The reports of Warren, Cobb, Osler, Cushing and others show a twenty-five to forty per cent. recovery following operation, while the recent reports of Eschner, who has resorted to a different operative procedure, show a recovery of fifty per cent. in fourteen operated cases. These reports conclusively suggest that operative treatment is the only treatment that offers any hope of successfully dealing with these cases. There is no question at the present time but that it is our duty to subject all cases of perforation of the intestine during typhoid fever to prompt surgical treatment.

The time to perform the operation is as soon as the perforation has occurred, or even in the so-called pre-perforation stage. If there is reason to believe from the clinical course of the disease, from the physical findings, from an examination of the blood, or from other

evidences that a perforation is likely to occur, laparotomy should be advised and performed without delay. If symptoms of perforation have occurred, and there is no reasonable doubt regarding the existence of the perforation, operation should be done at once. There is very little to be gained by subjecting patients who have suffered from perforation of the intestine, *and who are in a moribund condition*, to surgical operation. If the perforation has existed for a considerable period of time, if the symptoms of perforation were severe and the toxemia profound, recovery may usually not be expected to follow surgical treatment. The case, however, is hopeless without laparotomy and little is to be lost if the patient does not survive surgical measures.

It is not necessary in advising operation for a perforation in typhoid fever, that the diagnosis be positive. If a perforation is *strongly suspected*, or if there is a reasonable doubt regarding its existence, laparotomy should be the treatment of choice. It is the most conservative treatment for these patients, and even if a perforation is not found no undue amount of harm will have been done. It is generally agreed by most observers that we are not justified in waiting for positive symptoms or findings before advising operation to these patients. In this regard Osler says:

"As typhoid patients bear operation well, it is better to err in favor of surgery than to let valuable time be lost in waiting for further confirmatory evidence;" and also,

"In doubtful cases give the patient the benefit of the doubt and operate."

Cushing says, "When reasonably in doubt, explore."

Richardson is of the opinion that, "Operation should be done when perforation is suspected rather than demonstrated."

Greig Smith states, "At the worst, happen what may, the patient can be in no more deplorable condition than before operative interference was carried out, and I would plead for an attempt to reduce a mortality of one hundred per cent."

Chevalier believes that we should operate even when the diagnosis is not fully decided.

From the foregoing it will be seen that it is generally recognized in all parts of the world that early operative interference should be insisted upon in all suspected cases of typhoid perforation.

If this advice is followed it will now and then happen that an

unnecessary operation will be done. Occasionally the symptoms may seem plain and still no perforation exist. Another fact that is misleading in this regard is that local and general peritonitis can and does occur during typhoid fever without perforation of the intestine. These cases are analogous to those of general peritonitis that develop during acute cholecystitis, in which the gall bladder is not perforated and shows no evidence of gangrene. Rocard has reported several instances of this character. Alglave and Boysseau have also observed cases of peritonitis occurring in typhoid fever in which no perforation existed. It is probable that all of these cases will terminate fatally, and usually the prognosis is made better instead of worse by resorting to operation.

Operation of Choice.—As a rule the operation performed for perforation in typhoid fever has been laparotomy, with local or with general anesthesia, suturing of the perforation, cleansing of the peritoneum and drainage of the peritoneal cavity. It is probable, as has been shown by Anderson, of Pittsburg, and suggested by the work of Travers, done many years ago in the treatment of strangulated hernia, that intestinal toxemia is a very important factor in producing mortality in these cases of typhoid fever, or in any condition producing paralysis or paresis of the bowel. The part played by intestinal toxemia in producing mortality, and the fact that drainage of the intestinal tract, as practised and recommended by Eschner has given encouraging results, suggest strongly that we should use this method in operating. Washing of the peritoneal cavity, or extensive manipulation with the idea of removing infection from the peritoneum, is contraindicated in these cases. Drainage of the peritoneal cavity in the most dependent part, and removal of readily recognized collections of foreign materials are the only measures that are justified in assisting the patient to overcome the peritoneal infection.

PERITONITIS.

In presenting the indications for operative treatment in cases of peritonitis only infective peritonitis will be considered, in which the peritoneal changes, or the conditions on which the peritonitis is dependent, are the most important in treating the patient. The so-called chemical peritonitis will not be taken up; neither will the various peritoneal involvements that occur as metastatic affections, that terminate life in certain cases of Bright's disease, that compli-

cate pneumococcus infections in other portions of the body, or that develop as a part of general sepsis, rheumatism (Andral, Desplatz), or influenza, be discussed. These rare and uncertain varieties of peritonitis seldom, if ever, present indications for operative treatment.

Infective peritonitis is, as a rule, a surgical condition. In order to treat this affection properly there are certain general points that should be borne in mind.

Acute, general septic peritonitis is an extremely rapid and fatal disease. Surgery can do but little good in these cases if operation is delayed until the general peritoneal cavity has become completely involved. The majority of the cases of peritonitis are less virulent in character. They have a local starting point, and a local peritonitis, in most instances, precedes the general peritoneal inflammation. Another point that must be borne in mind in considering the treatment of peritonitis is that we are unable to say in any case that the entire peritoneum is affected. Regarding the efficiency of operation for more or less diffuse peritonitis, it must be remembered that it is impossible to mechanically eradicate infection in cases of peritonitis; that drainage materially assists the patient in limiting and overcoming the infection; and that the resistance of the patient, aided by rest of the part and not diminished by dissemination of the infectious material to uninvolved tissues, is perhaps the most important factor in preventing a fatal issue in cases of extensive peritonitis.

ACUTE, DIFFUSE, SEPTIC PERITONITIS.

These cases are, as a rule, dependent upon perforation of the hollow viscera or sudden rupture of retained collections of virulent, infective material. The treatment is surgical. Prophylactic operative measures afford the best means of dealing with acute, general peritonitis, for the reason that they prevent its occurrence. An appendix, a pus tube, a gall bladder and other tissues that contain infective material should be dealt with by surgical measures before a peritonitis has developed. The operative treatment of diffuse, septic peritonitis depends for its success on the time that surgical treatment is resorted to.

Acute pathologic or mechanical perforations should be treated by immediate laparotomy. If the operation is performed before an inflammatory reaction in the peritoneum has developed, the perforation or primary diseased tissue should be treated by closure or by

removal, and foreign material within the cavity should be thoroughly removed by sponging and by irrigating with sterile, non-irritating solutions. So-called antiseptics should never be used to remove infectious material from the peritoneal cavity.

If general septic cases of peritonitis are not operated upon until definite changes have occurred in the peritoneal cavity, closure of the perforation or removal of the primary diseased tissue is all that is indicated. Flushing of the peritoneal cavity, evisceration of the intestines, and the rubbing of inflamed peritoneal surfaces is not only without benefit, but is positively harmful in diffuse, septic peritonitis. Drainage at the seat of origin of the infection, and also in the most dependent part of the peritoneal cavity,—that is, through the cul-de-sac of Douglas or through the loins,—is all that is indicated or justifiable in general peritoneal inflammations. It is probable from the reported cases of peritonitis and from the experiences of Mixter, Barth, Senn and others that enterostomy is a procedure of decided value in assisting the patient to overcome general peritoneal infection, especially when marked distension, which is the rule, is present. The treatment of general peritonitis, then, in all but the beginning stages, is drainage of the peritoneal cavity without irrigation, and the performance of an enterostomy. These measures prevent, or diminish, the absorption of toxic material from the peritoneal surfaces and from the intestinal mucosa. They do not mechanically spread the infectious material; they relieve distension; and afford a means, if necessary, of nourishing the patient.

It is probable that multiple intestinal incisions followed by evacuation of the intestinal contents and closure of the intestinal wounds will be indicated in dealing with certain cases of peritonitis in which the intestinal paresis is marked, and there is reason to believe that an enterostomy will not relieve the distension.

LOCALIZED PERITONITIS.

The surgical treatment of localized peritonitis is extremely satisfactory. Drainage meets the immediate indications in these cases. If it is possible to treat the origin of the infection at the time drainage is done this part of the operation should not be neglected. Otherwise drainage is all that is required, and if necessary a secondary operation can be performed to deal with the primary diseased tissues. Irrigation should never be resorted to in doing this operation

and adhesions should be interfered with only to evacuate collections of infectious material. This statement holds good in operating upon advanced cases of localized peritonitis in which there is reason to suspect that the peritoneal involvement has become generalized. Better results will be obtained if the resistance of the patient is depended upon to overcome the general peritoneal infection, than if we attempt mechanically to eradicate a diffuse infection.

TUBERCULAR PERITONITIS.

In the treatment of tuberculosis of the peritoneum the pendulum has swung back to nearly the point at which it was when König, in 1884, performed the first surgical operation for the relief of this disease. The surgical treatment of this condition has been given an extensive trial and the result of the observations, both clinically and experimentally, has been to return these cases to the medical internalist, in the great majority of instances, for treatment. To-day the operative treatment of tuberculosis of the peritoneum is limited to a few selected cases. The technique of the operation does not extend beyond exposure and drainage, and the indications for operative treatment are gradually decreasing in number. The surgical treatment of tubercular peritonitis is far from a settled question at the present time. A consideration of the nature of the condition and a history of the operative and medical treatments of the disease explain why we are unable, at the present time, to say that one form of treatment should have the preference in this class of patients. It has been known for a long time that a tuberculosis of the peritoneum may exist, in many degrees of severity, and that the condition may or may not be associated with serious tuberculous changes in other portions of the body. It is also known that many of these cases yield to medical treatment, and it is usually admitted that spontaneous cure, that long ago was known to have been observed by Hilton and Fagge, is not an uncommon occurrence. It is also an established fact that many of the advanced and serious cases are subject to periods of remission under the influence of medical treatment, or of no treatment at all. For these reasons it has been impossible to determine the exact efficiency of operative treatment.

It is generally admitted that temporary improvement may be expected to follow operation in a large number of cases of tuberculosis of the peritoneum. The early reports of König, three immediate

good results following four operations, suggested that the operative treatment was positively indicated to relieve this disease. The same facts could be deduced from the reports of König in 1889, when he announced 131 cases of tuberculosis of the peritoneum that were operated upon, with great improvement in seventy-one per cent. Von Winckel's list of 287 cases showed immediate good results in seventy-five per cent. of them. The remote results of these reported cases, and also in the cases operated upon at a more recent date, show that the operative treatment is not followed by permanent benefit in a large number of cases. It is safe to say to-day that not more than twenty-five per cent. of the cases of tuberculosis of the peritoneum that have been subjected to operative treatment permanently recover. When we consider the fact that some of these cases recover spontaneously, or make rapid and complete recovery under efficient medical treatment, we are forced to ask the question with Fenger, "Are there any cases of tuberculous peritonitis for which laparotomy is the only means of cure, or in which laparotomy is the best method of treatment?"

Although the treatment of tuberculosis of the peritoneum usually belongs to the department of internal medicine, operative treatment is indicated in certain selected cases. Although the indications for operative treatment cannot be laid down radically, there is reason to believe that benefit can be given some of these sufferers in certain selected examples of tuberculosis of the peritoneum that resist medical treatment, and that show large accumulations of localized or free fluid. While it is probable that this opinion voices fairly well that held by a large number of operators to-day, there are some men who are close observers and who have had an extensive experience with this disease, who condemn operative treatment for all cases of tubercular peritonitis. Borchgrevink, in a masterly discussion of this subject, published in 1901, does not favor operative treatment for tubercular peritonitis in any of its forms. He admits that not a few cases have recovered under surgical treatment, but explains that most of these patients bear laparotomy well and that only the most serious cases may be expected to succumb under operative treatment. The trend of his argument leads one to believe that operative treatment is very seldom, if ever, indicated in relieving tuberculosis of the peritoneum.

Although patients suffering from tuberculosis of the peritoneum stand laparotomy well, as a rule, operative treatment for this condition is not entirely without danger. The reported cases of Herz-

feld, Frank and Bottomely show that the mortality of these operations is from one to two per cent. They also show that the serious complication of an intestinal fistula followed in six cases out of nineteen operations done on patients suffering from peritonitis tuberculosa sicca. A careful study of the reported cases of this disease that have been subjected to operative treatment, shows that much harm is done to the patient when extensive adhesions are separated, or when a portion of the diseased peritoneum is removed by excision. Although it is advised by some to-day that local tubercular infections of the peritoneum may be removed without danger to the patient, the cases in which this procedure can be carried out are very few indeed; and it is not admitted by all that local tuberculous growths can be removed safely.

If a decision has been made to subject a patient suffering with tuberculosis of the peritoneum to surgical operation, there is some discussion regarding the time at which the operation is best performed. Drackel, Schmitz, Nothnagel and Markel are of the opinion that early operation should be done for these cases. The advice of Gotti and Hildebrandt, based on experimental study and on a quite extensive clinical experience, is against early operative treatment. They have shown, experimentally, that operative measures aggravate early tuberculous changes in the peritoneum. It is not wise to do early operations in these cases. No operative treatment should be considered until medical and general measures have been given a thorough and extensive trial. If, after this has been done, the condition is gradually progressing in severity, and the general state of the patient is not such as to contraindicate the performance of any operation, then operative treatment may be advised, provided encapsulated or free fluid is present within the peritoneal cavity in considerable quantities.

The technique of the operative treatment of tuberculosis of the peritoneum is limited to-day to the exposure of the peritoneal cavity and to drainage. Curetting of the inflamed surface, removal of portions of the diseased peritoneum, or the division or separation of adhesions are no longer countenanced as legitimate procedures. Washing out of the peritoneal cavity at the present time has a few advocates, but it is probable that it is of very little service in the great majority of instances. The application of strong chemicals, as advised and practised by Hayem, Galvani, Westphal, Israel, Gustinelli

and others, should not be done to-day. The use of weak antiseptic solutions in the peritoneal cavity, as mentioned by Von Winckel, has been discarded for good reasons. The application of iodoform, or of iodoform emulsion, recommended and employed by Diddens, Rendu, Nore, Joser, Schmitz, Senn and others, has been followed with some success for a considerable number of years. It is probable that the value of this medication has been overestimated.

Although the treatment of tuberculosis of the peritoneum is a subject of discussion to-day, we are justified in limiting operations for this condition to simple exposure, and the drainage of collections of fluid. The treatment should be limited to those cases of subacute or chronic inflammations of the peritoneum that resist local and medical treatment, that are not getting better spontaneously, and that show evidence of free fluid, or encapsulated collections of fluid, in the peritoneal cavity. Beginning cases of this disease should not be subjected to operative treatment, and we should refuse to operate on cases of tuberculosis of the peritoneum that show marked tuberculous changes in other portions of the body, or that have produced a serious effect upon the patient's general condition.

ACUTE INTESTINAL OBSTRUCTION.

Acute mechanical obstruction of the bowel is a condition that can be treated successfully only by surgical measures. External manipulative treatment, the rectal insufflation of gases and the distension of the colon with liquids, while not without value in certain cases of intestinal obstruction, have been given too prominent a position in the treatment of this condition; and the delay caused by the prolonged application of these methods is responsible, more than anything else, for the present frightful mortality of acute intestinal obstruction. Without wholly condemning non-operative methods in treating acute intestinal obstruction, we may state positively that a delay of more than two hours in attempting to relieve an obstruction of the bowel by non-operative measures is never justifiable in acute cases presenting symptoms that are progressing in severity, and that point conclusively to complete occlusion of the intestinal tract.

The success of the operative treatment of acute intestinal obstruction depends entirely upon the early performance of the operation. The high mortality that follows operation for this condition and the objection to early operation, based on prejudice or from fear, offer

no legitimate excuse for not insisting upon laparotomy as soon as the presence of an intestinal obstruction can be determined. Operation is also indicated if the symptoms and history of the case are such that a diagnosis of intestinal obstruction cannot be made with any degree of positiveness. The intra-abdominal, acute conditions that closely simulate intestinal obstruction are, as a rule, legitimate cases for surgical treatment; and we are not doing the patient justice if we withhold a laparotomy early in the course of the disease in a case of acute intestinal obstruction, or other intra-abdominal conditions that simulate this disease so closely as to render a positive diagnosis impossible.

The character of the operation that will be required to give temporary or permanent relief in cases of intestinal obstruction will depend upon the condition of the patient and the cause of the obstruction. In all advanced cases of intestinal obstruction, in which the patient's vitality has been markedly lowered, enterostomy should be the operation of choice. This operation can be performed quickly without much shock or manipulation, and meets the immediate indications in most cases of acute mechanical obstruction. The operation, in most instances, is best performed in the right inguinal region according to the method advised by Nelaton many years ago.

If the condition of the patient is such as to permit the performance of a radical operation for the relief of acute intestinal obstruction, an extensive and serious operation will usually be necessary. The many operative procedures recommended and practised for the various conditions producing intestinal obstruction are discussed in all operative surgeries, and for this reason will not be considered here.

OCCCLUSION OF THE MESENTERIC VESSELS.

This condition may or may not present an indication for operative treatment. The symptoms are indefinite, by no means characteristic, and bear no distinct relation to the extent of the vascular occlusion. For these reasons a diagnosis is many times impossible; and if the condition could be positively recognized, it would be impossible to say before a laparotomy had been done that operation would, or would not, benefit the patient. If there is a reason to expect from heart or liver lesions, from the history of the case, the presence of tarry stools and obstructive symptoms with or without distension which occurs in fifty per cent. of the cases, that the mesen-

teric vessels are occluded, a laparotomy is indicated. Elliott has done a successful intestinal resection in a case of mesenteric vascular occlusion.

CHRONIC INTESTINAL OBSTRUCTION.

Chronic, progressive obstruction of the bowels is a sufficient indication for the performance of a surgical operation in all cases. If the obstructive symptoms are definite and are progressing in severity operation should be sought. It is not necessary that the condition should be advanced or that the location of the obstruction should be determined before operation is advised. It is only necessary to determine that the patient is suffering from a progressive narrowing of the intestinal lumen to urge surgical treatment. The operation that is necessary to relieve these patients can be determined only after the cause of the obstruction has been made positive by exposing the intestines.

TUMORS OF THE MESENTERY AND OMENTUM.

These are rare conditions, and present indications for surgical treatment as soon as they are recognized. In dealing with tumors of the mesentery an extensive resection of the intestines is indicated. The vascular supply of all of the intestine that is left after the operation has been performed must not be interfered with, to insure a successful result. Many times operation is not undertaken to relieve these cases until the tumors, which are usually malignant, have advanced to a stage that renders radical operation impossible. Palliative operations, either lateral anastomosis or enterostomy, offer the only means of giving these patients temporary relief.

RETRO-PERITONEAL BENIGN TUMORS.

Retro-peritoneal benign growths are of rare occurrence, but are of sufficient importance to demand careful consideration from the standpoint of treatment. Adami, Johnson, Horn and others, have shown conclusively from studies of the reported cases that the majority of these tumors are fibrolipomas and that they usually have their starting point in the perirenal fat or in the mesentery. The seriousness of the condition has been well shown by the studies of Adami. These cases rarely become malignant, but when they have attained to a considerable size destroy the patient's life on account of mechanically interfering with important organs.

The results of operations performed for the removal of these tu-

mors show a mortality of over fifty per cent. This high death rate is doubtless due to the fact that these growths are not recognized or subjected to surgical treatment until they have become so large that their removal is very difficult and dangerous. If the existence of a retro-peritoneal fibroma is suspected, its removal should be attempted as early as possible. On account of the benign nature of these growths, and their tendency to produce life-threatening symptoms if not removed, early operation is clearly indicated as it offers the only hope of reducing the mortality in patients who are suffering from this rare, but serious, affection.

RETRO-PERITONEAL MALIGNANT TUMORS.

Malignant growths behind the peritoneal cavity are uncommon conditions, but they occur sufficiently often, and are of sufficient importance, to demand careful consideration in relation to their treatment. The ultimate outcome of these cases is usually death, on account of the mechanical presence of the tumor. The most malignant forms sometimes produce death by cachexia and on account of metastasis, but all varieties of these growths may be expected to interfere with the circulation of the organs, and it is stated by Douglas and others, that the prognosis in all of these forms is grave, as they ultimately bring about death on account of pressure.

In view of the fact that the majority of these cases terminate life, and for the reason that most of them, even if malignant, are definitely encapsulated, surgical treatment is positively indicated in all cases of retro-peritoneal tumors as soon as the diagnosis is made.

The operation for these cases should consist of removal of the tumor. The danger attending this operation is injury to the vessels supplying the intestine. For this reason intestinal resection should be done at the time the tumor is removed, if there is reason to believe that the blood supply of the intestines has been interfered with sufficiently to result in anemic necrosis. The cases successfully operated upon by Harris and Herzog, and also the case operated upon by Shephard, necessitated extensive intestinal resections.

Early operation should be the method in all of these retro-peritoneal tumors, if marked cachexia is not present and the existence of metastasis improbable. The cases of this condition treated by removal of the tumor are too few at the present time to warrant us in making statements regarding the permanency of the results following radical operation.

XII. HERNIA.

INGUINAL HERNIA.

The presence of an inguinal hernia is by no means an indication for operative treatment. It is generally admitted that the radical cure is a safe procedure, and that recurrences following operation are rare. These facts should not teach us to advise operation indiscriminately, but should make us careful to detect the patients who are exceptions to the rule, and to be familiar with the few contraindications of herniotomy.

In arriving at a conclusion regarding the advisability of operating on an inguinal hernia, it is more important that careful attention be directed to the general condition of the patient than to the hernia itself. Herniotomy alone is a safe operation if the patient is in fairly good condition. Under certain conditions, however, it becomes a grave procedure and should not be advised without due consideration of all the factors bearing directly, or indirectly, on the immediate and remote results.

Owing to the fact that a simple inguinal hernia is, in most instances, compatible with a useful life, and offers no serious risk except that of strangulation, we should not advise its cure by operation if the patient's general health suggests a doubtful outcome. A heart or kidney lesion, or a diabetes, that would not contraindicate our advising an operation for appendicitis, should markedly influence, or control, our decision in advising treatment for an inguinal hernia that is not strangulated.

Age.—The age of the patient is an uncertain element in weighing the question of doing a herniotomy. A man of 70 may be a better risk than one of 50. Although the age of the patient gives us no positive information, it is of sufficient value to warrant discussion.

Generally it is unwise to do a herniotomy, except for strangulation, on patients under four years of age. My experience has been that infants stand the operation well. (I once operated on a strangulated hernia in a boy fourteen days old. He endured the operation well and made a complete and permanent recovery.) But as a rule a congenital hernia gives no trouble up to the fourth year, and it is good practice to give mechanical appliances a fair trial in these cases.

In patients from four to fifty years of age we should advise operation for all cases of simple inguinal hernia that show no marked signs of improvement after a well-fitting truss has been tried for one year, provided no serious general condition contraindicates operation. If pain, which according to Bull is present in 90 per cent. of the cases, or other inconveniences make operative treatment especially desirable, a compensating heart lesion, or a moderate degree of nephritis, should not stand in the way.

When the patient is past 50 years of age, these general conditions have a more serious phase. We should advise against the radical cure for hernia in patients between 50 and 70 years of age if we have any reason to believe that the taking of an anesthetic would be attended with any unusual risk. If the patient's general condition is such as to make us fearful of giving a general anesthetic, it is sufficiently critical to make us cautious of the shock incurred by doing the herniotomy under local anesthesia. It is by no means true that the shock occurring during operations under local anesthesia can be ignored.

It is a rare exception to the rule if a herniotomy for an uncomplicated hernia is indicated in a patient past 70 years of age.

Obesity.—Obesity in itself is not a contraindication to the radical cure of hernia. It must be admitted that obese patients, as a rule, stand operations poorly, and many times are anesthetized with difficulty. Nevertheless, they usually bear the operation of herniotomy without presenting alarming symptoms either during or after the operation. If there is associated with the obesity other general or local conditions that make any operative interference inadvisable or dangerous, the obesity should receive special consideration. In these cases, much can be done in the way of preparatory treatment in diminishing the excess of fat. This precaution should never be neglected in preparing obese patients for a herniotomy.

An irreducible hernia should be subjected to operation in all instances unless there exists a very serious contraindication to giving a general anesthetic, or to the shock attending the operation done with local or spinal anesthesia. The patient's general condition must be serious, indeed, to contraindicate operation for an irreducible hernia. The same is true of an inflamed hernia, a hernia containing the vermiform appendix, or a hernia whose sac is the seat of a tuberculous process, or is complicated with a hydrocele of the cord.

An acute inflammation occurring in an irreducible hernia is an indication for immediate operation if the diagnosis is made while the inflammatory process seems limited within the hernial sac. If the inflammation has already spread to the surrounding tissues, operation should be deferred until nature has limited the spread of the infection, or the presence of pus can be determined. This advice applies to cases without strangulation. The primary operation, in all acute infected cases, should be limited to drainage only. Nothing will be gained, and frequently much lost, if more is attempted. The presence of the appendix in the hernial sac, as has been observed in a number of cases, does not modify the treatment of these acutely inflamed cases.

A hernia complicated with an undescended testicle is a strong indication for operation. Of course, if the testis is internal to the boundaries of the internal abdominal ring, the inguino-perineal hernia of Küster and Eccles, its presence would not modify the indications for treating the hernia. However, if the testicle is so situated as to interfere with the wearing of a truss, the inguino-superficial variety described by Macready, Eccles, Moschcowitz and others, operation should be advised.

In hernias complicated with an undescended testicle Coley advises that operation should not be done until the patient is at least ten years of age. He maintains that if these cases are left alone for a time the testis will often descend into the scrotum of its own accord, making the operation less complicated. I feel that there is nothing to be lost in deferring operation in these cases until the patient is ten or twelve years of age.

Trusses.—A properly-fitting truss should be given a trial in all congenital cases, and should be advised in all reducible cases in which operation is refused or contraindicated. Many times the use of a truss will afford complete relief, and occasionally it may be the means of effecting a cure. A truss should not be considered in treating cases that cannot be reduced.

Injection Treatment.—The so-called injection treatment of hernia, although efficient in some cases, should not be advised in preference to herniotomy. If a patient absolutely refuses the cutting operation, and is dissatisfied with or cannot be relieved by a truss, it would be advisable to attempt a cure by the injection

method in preference to allowing the patient to pass into the hands of the advertising "specialist."

FEMORAL HERNIA.

What has been said regarding the operative treatment of inguinal hernia can, in the main, be applied to femoral hernia. The use of trusses in femoral hernia is an exception to the foregoing. It is rarely, if ever, possible to retain a femoral hernia in position with a truss.

UMBILICAL HERNIA.

Small, umbilical hernias of congenital origin or occurring in infants may or may not require operation. A well-fitting mechanical appliance that keeps the hernia reduced will result in permanently curing most of these cases. Operation is indicated for these small hernias only when they markedly inconvenience the patient, cannot be retained in position and are apparently increasing in size.

Umbilical hernia in adults presents, as a rule, indications for radical operative treatment. The immediate and remote results of this operation were considered a few years ago to be unsatisfactory, but at the present time, owing to a better technique and a more definite understanding of the anatomy of the hernial opening, the operations are usually no longer attended by immediate serious consequences, and recurrence of the hernia is rarely observed.

The hernial opening in these cases should be closed by overlapping in a transverse direction,—that is the upper and lower margins of the opening should be overlapped in preference to a lateral approximation of the hernial ring.

An appreciation of the general condition of the patient is of extreme importance in deciding for or against operative treatment in cases of large and long standing ventral hernia. Very obese patients are poor subjects for this operation. While the association of marked obesity, advancement in years, myocardial and valvular lesions, and permanent kidney affections, which so commonly presents itself in patients suffering from an umbilical hernia, does not positively contraindicate the performance of a radical operation, it impresses us with the fact that no small risk is incurred by many of these patients in submitting to the radical treatment of umbilical hernia. A careful consideration of all the factors in the case and an experience based

upon operating a large number of these cases are essential to make a proper selection of the types of umbilical hernia that should be subjected to radical operative treatment.

EPIGASTRIC HERNIA.

Small epigastric hernias, in all probability are in a certain proportion of instances capable of producing symptoms that are sufficiently distressing to warrant operative treatment. It has been claimed that these hernias produce definite gastric symptoms in eighty per cent. of the cases. Many times small epigastric hernias are responsible for distressing and prolonged gastric symptoms; many times these patients are neurasthenic; and in perhaps most of these cases operative treatment is positively indicated. Mechanical appliances do not seem to give these patients relief.

Most of these epigastric hernias are situated above the umbilicus and are not directly in the median line. The operation for curing them is simple and is not attended with risk.

While it is impossible at present to state with any degree of positiveness the significance of small epigastric hernias, one is led to believe that these small hernias are capable of producing definite symptoms, and that their operative treatment is not only justifiable, but is positively indicated in a large number of instances.

POST-OPERATIVE HERNIA.

Post-operative hernias are surgical conditions, and in most instances indicate operative treatment. The operation necessary to cure these hernias is well understood and varies, of course, with the size of the hernial orifice and the location of the rupture.

STRANGULATED HERNIA.

Strangulation occurring in any hernia is an unquestionable indication for immediate surgical intervention, if the condition cannot be relieved easily and quickly by taxis. We are not warranted in advising delay in these patients after the diagnosis has been made, nor are we warranted in subjecting them to prolonged manipulation with the idea that an operation may be avoided. Time that is lost at the beginning of a strangulation is of greatest importance to the welfare of the patient. The mortality from strangulated hernia should be practically nothing if operation could be performed within a few hours after the strangulation has occurred. We are not safe in say-

ing that an operation will or will not be necessary in any case of strangulated hernia without resorting to taxis. We should always try to reduce the strangulation before resorting to operation. There is no danger in using moderate force in trying to reduce a strangulated hernia if this is done at the very beginning of the strangulation. If the strangulation has existed for a few hours the conditions are quite different. If the hernia was irreducible before strangulation occurred, taxis is positively contraindicated. A radical operation must be resorted to at once in these cases. If, from the local and general findings, there is reason to believe that an inflammatory process has developed in the hernial sac, or in the tissue surrounding it, no attempt should be made to reduce the strangulation by taxis. If there is reason to believe, on account of the general symptoms and the local findings, that the strangulated intestine is seriously impaired, if not gangrenous, it is unwise to attempt reduction of the hernia by taxis. If there is reason to believe that the intestine is in good condition, but that the tightness of the constriction prevents reduction, aspiration of the hernial contents, as advised by Hern, would seem indicated. It is believed that this is a dangerous procedure and has no place in the treatment of strangulated hernia. Although it is impossible to lay down definite rules regarding the advisability of trying to reduce strangulated hernias by taxis, we are safe in saying that we are not justified, in any case, in resorting to repeated efforts when taxis has been unsuccessful under anesthesia. As a rule, we are correct in saying that taxis is positively contraindicated if the strangulation has existed for more than twenty-four hours.

If manipulative methods succeed in reducing the strangulated hernia the patient cannot be considered out of danger. If there is reason to believe from the general symptoms that the strangulation has not been relieved, operation should be resorted to at once even if the hernia has been reduced. The reduction of a strangulated hernia *en masse* is an uncommon occurrence, but is of sufficient importance to warrant careful consideration.

When operation has been decided upon for the relief of a strangulated hernia there are certain indications that are always to be met, and certain procedures that should or should not be done, according to the condition of the patient and the contents of the hernia. If operation is done early and the contents of the hernia are in good condition, and the patient's general state is not serious, general

anesthesia can be resorted to and the radical operation carried out in the same manner as would be done if strangulation was not present. The great majority of patients, however, who are subjected to operative treatment for strangulated hernia do not present features so favorable as these just stated. General anesthesia should be avoided in all of those cases in which the patient's physical health is not good; in which profuse vomiting is present, and in which inflammatory reaction in the hernia has occurred. Local or spinal anesthesia should then be resorted to.

If an operation is done the relief of the constriction is the first indication. This must be exposed and severed in all cases. The remaining procedures that may or may not be called for are best considered in relation to their importance. If the intestine is so involved that it is impossible to determine positively that it will regain its vitality, the constriction should be divided and the contents of the hernia left in position. Moist, aseptic compresses should be placed upon the intestine and left three or four hours, or even over night, as has been done by Erdmann. If the loop of intestine regains its viability it can be returned to the abdominal cavity and the radical operation carried out. In these cases the relief of the constriction improves the patient's general condition.

If, on the other hand, the intestine becomes gangrenous it should be incised. If the patient's condition remains unimproved, nothing further than incision of the gangrenous loop should be undertaken at this time. If this will not give relief there is very little to be hoped for in subjecting the patient to a radical operation or intestinal resection.

If the hernial contents shows positive evidences of gangrene without the existence of an inflammatory process outside of the intestinal walls, primary resection can be resorted to if the patient is sufficiently strong to warrant the operation. If there seems to be some doubt regarding the advisability of subjecting the patient to the shock following an intestinal resection, incision of the gut only should be done. Of course, there is some difference of opinion regarding the mortality rates that follow this procedure. I am convinced, however, that resection should not be done unless the patient's general condition is fairly good.

If local or inflammatory evidences are found outside of the hernial contents nothing but incision should be effected at the primary

operation. No attempt should be made to break up the adhesions that bind the hernia in the hernial canal. Division of the constriction with incision of the intestine will give temporary relief in these cases, and offers little risk of spreading the inflammatory process. If these cases have advanced to a stage in which general peritonitis has developed, little relief can be expected from any operative procedure.

The operation advised by Helferisch--intra-abdominal intestinal anastomosis between the two limbs of the strangulated gut--has no place in the primary treatment of strangulated hernia. If a fistula has resulted, or an artificial anus remains, Helferisch's method may be employed advantageously.

There is one statement that is mentioned often in considering the operative procedures advised for strangulated hernia that seems to me without foundation. I refer to anchoring of the intestine in making an artificial anus, or in simple incision of the gut. If the condition has advanced to such a degree that it is not advisable to reduce the strangulated intestine, it will usually be found that there is inflammatory reaction sufficient to result in the formation of adhesions that are firm enough to hold the intestine in place. No manipulation is justified, and no suturing advisable, in the attempt to hold an intestine from falling back into the peritoneal cavity.

XIII. THE LIVER AND SPLEEN.

MOVABLE LIVER.

The surgical treatment for a markedly movable or floating liver is at the present time in the experimental stage. It is generally believed, however, that a floating liver is capable of producing distressing symptoms, and that operative treatment is indicated for all of these cases if the condition is not associated with general enteroptosis. Carstens, in 1902, was able to collect 98 cases of floating liver that produced more or less severe symptoms. In the majority of these cases the patients complained of marked digestive symptoms, attacks of diarrhœa, with occasional presence of pain in the region of the liver.

A few of these cases have been subjected to operative treatment and the results thus far have been encouraging, and seem to warrant us in fixing a liver that is abnormally movable, that produces severe symptoms and is not associated with severe complications.

The operation that has generally been performed in relieving these conditions is that known as the Kehr operation. This corresponds to the procedure of Rydygier for fixing the spleen. The anterior surface of the liver is freshened, and the organ is held in position by sutures passing through its capsule and through the costal margins. It is probable that this operation will be efficient in dealing with the great majority of these cases, especially if enteroptosis is not present. The operation of Depage, which consists of suturing the liver in position, followed by resection of the abdominal wall, will rarely be indicated in most of these patients. If the condition has advanced to such a degré as to require extensive resection of the abdominal wall, it is probable that non-operative measures will be as efficient in giving good results as will these extensive operative procedures.

As these cases are all associated with more or less marked nervous symptoms no operative treatment should be advised unless it can be determined, with a reasonable degree of certainty, that the nervous symptoms of the patient are secondary to the displaced liver, and that the markedly movable organ is responsible for the majority of the symptoms complained of.

HEPATIC TUMORS.

Tumors of the liver present an indication for operative treatment in cases in which the growth is not extensive, and from the appearance of the growth and the condition of the patient there is reason to believe that the operation will not be attended with fatal hemorrhage. Anschulz has collected 96 cases of resection of the liver for neoplasms. Seventy-five of these recovered and seventeen died from the operation. The great danger is from hemorrhage. If there is reason to believe, on account of the location of the tumor, that the hemorrhage can be controlled, excision should be resorted to.

It is generally agreed that all varieties of tumor involving the liver present an indication for removal, with the exception of gummas. Of course, extensive malignant growths should not be subjected to attempted removal.

In doing these operations an elastic constriction should be placed between the tumor and the liver, if this is possible. It may be advisable, in some, to allow the elastic constriction to spontaneously separate the tumor. This has been done successfully in at least one case. Resection, by means of a V-shaped incision, made with a knife or with cautery, is successful in some instances. The thermo-cautery does not prevent severe bleeding, but is efficient to control oozing. If the situation of the tumor will permit, large clamps should be used to crush the surface beyond the lines of incision. Kocher has resorted to this method and believes that we should leave the clamps in place for forty-eight hours. It is probable that in the great majority of these operations either a thorough suture tied over gauze, rubber tubing or bone chips will be the method of choice in controlling hemorrhage. All of these cases should be drained and a firm tampon put in place to assist in controlling the hemorrhage. Ligation of the large vessels many times should be accomplished. Occasionally a large vessel may be occluded by passing a ligature around it with a needle. All of these methods, and a combination of them, will usually be required in performing these operations.

In certain cases resection of the liver is best accomplished, from the standpoint of a limitation of the bleeding, by the so-called flap-method of Frank. In doing this operation flaps of liver tissue are made that accurately approximate the cut surfaces of the liver. This feature is believed to be very efficient in curtailing hemorrhage. It should be employed whenever the local conditions will permit. In

doing this operation all cutting into the liver tissue should be effected with a very sharp knife and the cut surfaces should be made as smooth as possible. The flaps should be shaped to cover the cut surface of the liver accurately, and so as to avoid dead spaces and exposed cut surfaces of liver tissue.

ECHINOCOCCUS CYSTS OF THE LIVER.

These cases should be treated by drainage. Aspiration and injection is dangerous and many times does not secure a permanent result. Incision, on the other hand, is free from danger and as a rule relieves the patient permanently. If the cyst is large, is single and points anteriorly, the operation should be done from in front. Occasionally a posterior opening is advisable, but as a rule it is not necessary to go through the thoracic cavity in order to drain an echinococcus cyst efficiently. The injection of chemicals into the evacuated cyst is by no means free from danger and is not essential to secure a good result.

ABSCCESS OF THE LIVER.

Localized collections of pus in the liver should be drained as soon as the diagnosis is made. Aspiration as a diagnostic aid, or as a therapeutic resource, should be advised against. It is dangerous to perform and does not produce a cure. If these abscesses are superficially located and are not multiple they can usually be drained successfully. If the abscess is the result of a pyelephlebitis recovery may be expected in a large percentage of the cases. On the other hand, if the abscess is of the pyosepticemic variety, or if the abscess is hematogenous, or if multiple abscesses are present, surgery will doubtless be indicated but recovery usually not expected. Abscesses of the liver, following typhoid fever, should be treated surgically. If these collections of pus are not multiple recovery may be expected to occur; otherwise the result will doubtless be fatal, and but little is to be lost by giving the patient the benefit of operative treatment.

Multiple collections of pus in the liver, following septic cholangitis, rarely recover. It is probable that multiple openings into the liver, associated with drainage of the gall bladder, may be of benefit in some of these cases. Treves reports a case of recovery following operations done on a patient suffering from multiple hepatic abscesses.

In all of these operations to drain hepatic suppurations the work

should be done at two sittings if the location of the abscesses is such that there is reason to believe the peritoneal cavity cannot be protected from infection if the abscess is opened at the primary operation. However, as a rule the localized collections of pus in the liver can be opened with comparative safety at the primary operation. Incision into the liver, to open an abscess, should be done by blunt dissection and should be enlarged with the finger. It is not necessary that a cautery be used in opening these abscesses.

HYPERTROPHIC CIRRHOSIS OF THE LIVER.

At the present time there is no surgical treatment for cases of hypertrophic cirrhosis of the liver. Rosenstirn has subjected two of these patients to operations similar to those of Morrison and Talma, that have been recommended and practised extensively in cases of atrophic hepatic cirrhosis. Although the results in these cases were apparently encouraging, it is probable that the operation will not be found to be efficient. Of course it is probable that the diversion of the supposed toxic intestinal blood from the liver may aid materially in regenerative processes in the liver. It is also probable that the regeneration in cases of hepatic cirrhosis, which undoubtedly does occur, will not be affected sufficiently to indicate the performance of this operation in the majority of cases.

At the present time operations for hypertrophic cirrhosis of the liver must be considered experimentally, and cannot be advised in any case from a consideration of the pathology of the disease and the rationale of the operative treatment.

Cholecystostomy has been recommended as a palliative and as a curative measure for hypertrophic cirrhosis of the liver. Delangeriere is of the opinion that there is present a positive indication for drainage of the gall bladder in cases of hypertrophic cirrhosis. This operation, of course, is in the experimental stage and nothing can be said at the present time regarding its efficiency.

ATROPHIC CIRRHOSIS OF THE LIVER.

During the last few years so much has been said regarding the advisability of performing operations for the relief of atrophic cirrhosis of the liver, and so many different opinions have been voiced by equally good men, that at the present time one can find argument to sustain any position in connection with the advisability of doing operations for this disease, or the operation that is claimed to be most

efficient. The opinion is here given, however, that operative treatment should never be advised for atrophic cirrhosis of the liver with the idea of permanently curing the patient. It is probable that some operative procedures may be of benefit to these patients as a palliative measure, but the benefits from the operation in the way of prolongation of the patient's life are not of sufficient value to warrant us in the undertaking.

All of these operative procedures accomplish mechanical removal of the ascitic fluid, and depend for their curative value upon diversion of the portal blood into the systemic circulation without passing through the liver. If, as there is reason to believe, the portal blood in these cases is hypertoxic, these operations may protect the liver, but they do not diminish the work that must be done by the entire system. The organs of the body, other than the liver, must compensate for the defective liver tissue after these operations have been performed. When we consider that the changes in cirrhosis of the liver are not limited to the hepatic tissue, but are well marked in the circulatory and renal organs, it is unreasonable to expect that permanent relief can follow the operations that have thus far been devised for curing this condition. It is true that as a rule the temporary results in the operated cases seem to justify the procedure, but it is probable that these operations do not materially prolong the patient's life and do not diminish, to any extent, the inconvenience.

The majority of the patients who have been subjected to this operation suffered from toxic symptoms to a greater or less degree. It was shown long ago by Hann and Eck, and later by Salaskin and Zuleski, that in animals anastomosis between the portal vein and the vena cava resulted in the production of pronounced and sometimes fatal toxic symptoms. Similar symptoms, of more or less severity, have been observed in human beings who have been subjected to operations for cirrhosis of the liver that divert the portal blood from the liver into the general circulation. The reports of Stockton, Morrison, Packard, Schiassi and others show conclusively that these toxic symptoms do occur and that sometimes they become very serious.

The type of operation that has been ordinarily performed to relieve cirrhosis of the liver consists of laparotomy, suturing of the omentum to the parietal peritoneum and rubbing of the surface of the liver with gauze. This operation was first proposed by Talma, and independently suggested by Morrison and Drummond. It was first

done by Vondermendem, of Holland, in 1889. Many modifications of this procedure have been advised and practised, but the principle in all is the same. Greenough is of the opinion that the operation is more efficient when the omentum is spread out between the layers of the abdominal walls.

Porto-caval anastomosis has been suggested to relieve cirrhosis of the liver. It was first performed by Vival in 1903. This accomplishes the object aimed at in doing Talma's operation. It is probably not more efficient in cirrhosis and is doubtless much more serious to perform.

Simple abdominal incision, with removal of the fluid from the peritoneal cavity, has been practised in relieving hepatic cirrhosis. This operation can only be considered as palliative and should be placed on the same basis as paracentesis.

A consideration of the immediate and remote results following operative treatment for cirrhosis of the liver appears to show clearly that we are not justified in undertaking this operation with the idea of securing permanent relief, and that the reported cases do not show satisfactory improvement, extending over a sufficiently long period of time, to warrant this operation. Greenough collected 105 cases of cirrhosis of the liver that had been subjected to Talma's operation. Improvement was found in only nine of these after a period of two years. Monprofit, after studying the reports of 224 operated cases, came to the conclusion that the results justified the operation. When we consider that many of these cases succumb to the operation, that in most instances a patient will refuse operation until the disease is well advanced, and that we cannot promise a permanent cure in any case, we should hesitate before advising surgery in hepatic cirrhosis.

The advice of various men regarding the advisability of these operations is such that little can be gained by studying their reports. They all agree, however, that if it has been decided to operate the operation should be done early. They also agree that if it is done while the patient is in a good condition the mortality is very small. The advice of Talma and of Monprofit suggests that we should perform this operation in most of these cases. Talma is of the opinion that his operation materially helps the changes in the liver, that it is efficient in preventing and controlling hemorrhage, and that it is possible that it may do good in those serious cases associated with portal thrombosis. Delangeriere, Roux and Tuffier, after considering

the reports of others and from their own extensive experience, believe that Talma's operation is perhaps not justifiable.

It is probable that the radical surgical treatment for atrophic cirrhosis of the liver will in the future be looked upon as unjustifiable. We shall continue, in all probability, to do palliative operations in a certain number of these cases. The removal of the fluid from the peritoneal cavity will doubtless be indicated in many advanced forms. Epiploexy will be indicated to relieve hemorrhage in some of these cases, but as a rule the operative treatment will doubtless be limited to these palliative measures. If it can be pointed out, experimentally and clinically, that an operative procedure can be devised that will aid materially the regenerative process that has been shown to occur in cases of cirrhosis of the liver, surgical treatment may become a routine practice for these, at present, incurable diseases; but until we are able to surgically do that which will cure these patients we are safe in advising only palliative measures.

SPLEEN.

During the last few years many surgical operations have been advised and performed to relieve certain diseases originating in the spleen, or affecting this organ. Although the number of these operations has been many and the indications for operating upon the spleen are numerous, we know very little regarding the physiology or the pathology of the organ, and we know still less regarding many of the diseases that we desire to treat surgically. While the knowledge of splenic diseases and the best method for their treatment remains practically an unwritten chapter we should not advise surgical operation without carefully considering all the elements in the case and the probable outcome, with and without surgery.

INJURIES TO THE SPLEEN.

Subcutaneous or open incised or lacerated wounds of the spleen are serious injuries. The mortality of these cases is high and the surgical treatment is not always successful. There is no question at the present time that hemorrhage from the spleen presents a positive requirement for surgical treatment. A laparotomy should be made as soon as possible and the wound of the organ dealt with according to the extent of the injury and the condition of the patient. Suturing of splenic wounds, according to Lamarchi and Madeling, may be indicated in certain cases, but this will rarely be applicable in wounds of

the spleen. Cauterization has not been successful in splenic injuries. Tamponing, recommended by Kelling, will be found unsatisfactory in a large number of these cases. Ligation of the splenic artery, studied by Jonnesco, cannot be depended upon to produce good results. It is true that this method stops hemorrhage, but death from toxemia many times follows. It is possible, according to the experiments of Pirone, that ligation of the splenic vessels, followed by enclosure of the spleen with the great omentum, will not be followed by toxic symptoms and may be found to be an efficient method in these otherwise dangerous and some times fatal injuries. Ligation of the splenic vessels completely controls the hemorrhage, and if Pirone's method succeeds in preventing necrosis of the spleen his operation will doubtless become popular to stop splenic bleeding.

At the present time, in dealing with wounds of the spleen, we should resort to Senn's method of forcipressure of the wound margins, followed by suturing, if there is reason to believe that this method will control the hemorrhage. Otherwise, splenectomy will be indicated. Splenectomy for wounds is a serious operation, but the mortality depends upon the amount of hemorrhage that has occurred before the operation is done. Occasionally partial splenectomy, studied by Jordan, may be indicated in exceptional splenic wounds.

WANDERING SPLEEN.

Wandering spleen is not a common disease and can be treated successfully only by surgical measures. If a wandering spleen is found accidentally operation should be advised for the reason that degenerative changes in the organ may be expected to occur if it is not replaced.

The operation that has been most extensively performed for this condition, and that in all probability will be indicated in these cases, is removal of the organ. This operation is demanded on account of the degenerative changes that are so commonly found in wandering spleen. If operation is performed before the spleen has become more or less disorganized, splenopexy should be the one of choice. Splenopexy is not a serious operation and, if properly done in selected cases, should give good results. At the present time perhaps fifty cases of wandering spleen have been treated by surgical measures. The results have been sufficiently encouraging to warrant operative treatment for this condition.

ABSCESS OF THE SPLEEN.

Localized collections of pus occur in the spleen as primary conditions; associated with typhoid or malarial diseases; and secondary to osteomyelitis, appendicitis, omental suppurations and general septic conditions. At present perhaps sixty-five of these cases have been reported. The condition is recognized on account of the location of the symptoms, previous history of the case, and exclusion of other diseases. The treatment, of course, is always surgical.

It is probable that in the majority of these cases of suppuration in the spleen removal of the organ must be resorted to. If the diagnosis is made early and adhesions are not present, splenectomy will give good results. If the suppuration is extensive and has resulted in marked perisplenic adhesions, incision and drainage should be the operation performed. Simple drainage should always be done in all cases of splenic suppurations that have advanced to the stage that they render removal of the spleen a dangerous operation. The results in these cases have been satisfactory considering the seriousness of the conditions associated with splenic suppuration. There is no question but that early splenectomy is positively indicated in all cases of splenic suppuration.

SPLENECTOMY.

Splenectomy is a very old operation and, while it is not infrequently performed at the present time, we know little regarding the diseases for which it is done, and we are not thoroughly familiar with all the effects resulting from removal of the part. The modern operation is not attended with a large mortality and depends for its seriousness largely on the conditions for which it is undertaken. At the present time we should not hesitate to remove the spleen if the pathological conditions demand such a treatment. Occasionally, however, the operation has been done for reasons that did not seem to warrant it, more than did the conditions for which, according to Bartholomeus and Shattuck, the Turks and Indians removed the organ. It is reported that the spleen of foot-racers was removed to prevent "stitch in the side."

MALARIAL SPLEEN.

Enlarged spleen, associated with chronic malaria, is found associated with marked anemia and even wasting of the patient. These

cases have been subjected to removal of the organ with a mortality of perhaps twenty-three per cent. It is probable that in certain chronic forms of malaria with a markedly enlarged spleen, associated with progressive wasting of the patient, splenectomy may be indicated. It should never be performed in the early and less severe stages of the disease.

SPLENIC ANEMIA.

Although we do not know the pathology of this condition, the cause of it, or its starting point, these cases have been subjected to splenectomy. It is impossible to say at the present time that the results do or do not warrant the operation. Successful cases have been reported, and cases have also been reported in which the operation did not benefit the patient. The mortality of this procedure has been twenty per cent. On account of the fact that these cases cannot be cured by any known means, and for the reason that temporary relief, at least, has been obtained in a large percentage of cases, when subjected to splenectomy, the operation is justified if the condition is a progressive one and does not yield to other forms of treatment. The treatment of these cases by means of the X-ray should be given a trial before surgical operation is advised.

SPLENIC LEUKEMIA.

Although perhaps five recoveries have followed splenectomy for splenic leukemia, the operation at the present time is considered unjustifiable. Jordan makes the positive statement that we should not perform this operation. Hagan reports forty-two splenectomies done for leukemia, with only four recoveries.

BANTI'S DISEASE, OR HYPERTROPHY WITH CIRRHOSIS OF THE LIVER.

Owing to the fact that these cases are rare, and that we know little regarding the nature of them, we are unable to advise a rational treatment. Splenectomy has been performed in something like sixteen cases of Banti's disease, and only three deaths have followed. While this mortality rate would seem to indicate the advisability of this operation, it is probable that the surgical treatment of Banti's disease will be less popular in the future than it has been in the past. In most of these cases pronounced and sometimes advanced changes are found in portions of the body not connected anatomically or physio-

logically with the spleen. It is probable that kidney, liver and cardiac changes would contraindicate the performance of splenectomy in a large percentage of the cases of Banti's disease.

SARCOMA OF THE SPLEEN.

The cases of sarcoma of the spleen that have been reported show conclusively that primary sarcoma of the spleen does occur and that it is amenable to successful surgical treatment, especially in the early stages. Whenever this diagnosis is made, splenectomy is indicated. The results, both immediate and remote, depend of course on the variety of sarcoma and the promptness of the treatment.

CYSTS OF THE SPLEEN.

Cysts of the spleen have been occasionally observed. They are benign in character and are amenable to successful surgical treatment. If the cysts are large and have practically destroyed the entire splenic structure extirpation is indicated. Drainage should be the operation of choice in the varieties of benign cysts of the spleen that have not resulted in destruction of the greater part of the organ. The results of the surgical treatment of splenic cysts have been very encouraging and suggest that operative treatment is clearly necessary for all benign varieties.

XIV. THE KIDNEYS AND SUPRARENAL CAPSULES

THE KIDNEYS.

As a rule the indications for surgical treatment of injury or disease involving the kidneys are well known. There are, however, certain points concerning which there exists a difference of opinion regarding the advisability of performing operations, and the operation that is most efficient in dealing with them. As a rule it is well known that nephrectomy for acute conditions is a serious undertaking and should be avoided whenever possible. Removal of one kidney for a long-standing disease that has actually destroyed the secreting structure of the organ, and that has been associated with compensatory hypertrophy in the opposite kidney, is a comparatively safe procedure.

Removal of a kidney should not be undertaken unless the existence, and the functional activity of the opposite organ has been positively determined. Another statement that should be borne in mind in dealing with diseases of the kidney is that acute suppurative processes are best treated by simple drainage at the primary operation.

INJURIES.

Surgical treatment is indicated in cases of subcutaneous or open injuries to the kidney, to stop hemorrhage, to drain infections and to relieve acute retention.

In cases of subcutaneous injuries to one or both kidneys operation should not be resorted to for the relief of hemorrhage unless the extravasation of blood in the region of the kidney is extensive and has occurred rapidly, or unless the hemorrhage into the bladder is severe and prolonged. Many of these cases showing moderate or quite extensive hemorrhage at the beginning do not require surgical treatment. If an incision is made for the relief of hemorrhage from an injured kidney it rarely happens that nephrectomy is required. In these cases tamponing or suturing and ligation will be entirely sufficient to control the bleeding. Partial resection of a kidney may be occasionally required in some of these cases. On the other hand if the extensive bleeding finds its way into the pelvis of the kidney and

into the bladder, nephrectomy may be indicated. Primary nephrectomy should not be resorted to for the relief of hemorrhage following injury to the kidney unless all other measures fail. Temporary occlusion of the renal vessels by the use of a protected clamp may be resorted to in preference to removal of the kidney in cases in which the loss of blood has been great, and in which palliative operations on the kidney structure are insufficient.

The operative treatment for hemorrhage from an injured kidney resulting from an open wound will usually be limited to packing, suturing or partial resection of the organ. Nephrectomy should not be resorted to unless it is found that most of the secreting structure of the kidney has been destroyed, or unless all less radical measures fail to stop the hemorrhage.

Primary operative treatment for the prevention of infection is never indicated in cases of injury to a kidney. Nothing should be done in a surgical way unless evidences of infection are present. Should this complication occur free incision and drainage down to the kidney itself, is all that is demanded. If this does not relieve the condition, and a true surgical kidney develops, removal of a portion, or of the entire organ, may occasionally be required. Early and efficient drainage, however, will be all that is necessary in the great majority, if not all, of these infections that follow injury.

It may occasionally happen that a unilateral or a bilateral lumbar incision may be necessary to relieve acute anuria following injuries to the spine or region of the kidneys. If the anuria is persistent and does not yield to non-operative measures the kidney capsules should be incised and stripped from the organs. The same operation is indicated in cases of anuria following operations, anesthesia or chemical toxemia. The reported cases of operations of this character done for the relief of anuria following prolonged anesthesia have been very encouraging indeed. The results warrant us in advising this method of procedure for all of these cases.

RENAL CALCULUS.

Operative treatment is indicated in cases of renal calculus in which the symptoms of pain are severe and of long-standing, in which serious infection of the kidney has occurred, or in which persistent calculus anuria has developed. As a rule there is little dispute regarding the indications for operating upon a kidney contain-

ing a calculus if the foregoing symptoms or conditions are present. It may be stated, however, that the advice of Rosving, who believes that a renal calculus should be removed through the structure of the kidney and not through an incision made into the pelvis, should be the method of choice. Cortical incision into the kidney should be the operation of choice in exploring the renal pelvis for the presence of stones, or for their removal.

If a renal calculus has resulted in infection of the organ, surgical treatment is indicated. Drainage is all that should be done at the primary operation in these cases. This is especially true if the infection is acute or subacute. The appearance of the diseased kidney does not modify the indications for treatment. An acute suppurative kidney which appears to be entirely destroyed by the suppurative process, should not be removed at the primary operation. The small portion of kidney tissue that remains materially assists the other kidney in doing its work. Many times these badly degenerated kidneys are able to do a portion of the work, and complete healing, after drainage, is a common occurrence in these cases. If, however, after the kidney has been drained, profuse and prolonged suppuration takes place the remnant of the kidney should be removed before the infection has seriously affected the patient's general condition, or has involved other organs.

Hydronephrosis resulting from an impacted renal calculus presents a positive indication for operative treatment. The operation in these cases should attack the location of the stone, and should consist of removal of the calculus. Incision of a kidney the seat of the hydronephrosis should not be resorted to unless the other kidney is seriously impaired, and the condition of the patient is such that the operation for the removal of the calculus would be attended with grave danger. If a hydronephrotic kidney is incised the operation should be considered palliative only and should be done simply to prepare the patient for the radical measure.

SURGICAL KIDNEY.

Acute or subacute surgical kidneys should be treated by incision and drainage as soon as the condition is recognized. The statements regarding the removal of the kidney that have been made in discussing calculus suppurative pyelitis hold good for all form of surgical kidney. Of course these statements do not apply to tuberculous infections.

HYDRONEPHROSIS.

Hydronephrosis as a rule demands surgical treatment. As hydronephrosis is always secondary, the operation should not attack the kidney itself with a hope of relieving the symptoms, but should have for its object the removal of the mechanical obstruction that produces the condition. As this obstruction may be in any portion of the genito-urinary tract, from the pelvis of the kidney to the external urinary meatus, little is to be gained by discussing the various operative procedures that may at times be performed for the relief of unilateral or bilateral hydronephrosis.

CONGENITAL CYSTIC KIDNEYS.

This condition is usually bilateral, many times it is unrecognized, and as a rule it is not amenable to medical or surgical treatment. If a solitary cyst could be recognized to exist in one kidney, and at the same time the other kidney was doing normal work, operation on the affected organ would be indicated if the cystic involvement was producing symptoms of a character sufficiently severe to markedly inconvenience the patient. As a rule, however, there is little to be gained by subjecting patients suffering from congenital cystic kidneys to surgical treatment.

BENIGN SOLID GROWTHS.

These tumors are rare, usually produce no symptoms and seldom present indications for removal. A small number of these cases have been operated upon successfully by resection or by nephrectomy. If the existence of a benign renal tumor is probable, and the symptoms complained of are severe, exploratory operation, followed by removal of the tumor or by nephrectomy, would be indicated.

MALIGNANT TUMORS.

A carcinoma of one kidney presents an indication for nephrectomy if the tumor is primary in the kidney and has not extended beyond the capsule of the organ. Early removal of the kidney should be done in all of these cases, provided the opposite kidney shows no evidence of involvement.

MALIGNANT AND SEMI-MALIGNANT MESOBLASTIC NEOPLASMS.

Sarcoma and endothelioma of the kidney that are rapid in their growth present an indication for nephrectomy if the disease is recog-

nized while it is limited to one kidney. There is ground for the opinion that little is to be gained by operating upon these growths if they have been of long-standing, do not produce serious symptoms and are not associated with marked wasting of the patient. It is true that these growths can be removed apparently successfully but, as a rule, the opposite kidney will become speedily affected if these slow-growing malignant or semi-malignant growths are interfered with.

TUBERCULOSIS OF THE KIDNEYS.

Primary tuberculosis of the kidney, in the great majority of instances, presents a positive indication for surgical treatment. Non-operative treatment is productive of very few, if any, permanent cures of this serious and not uncommon condition. Although it is possible that certain cases of tuberculosis of the kidney have recovered under medical and hygienic measures, they are extremely rare. We are justified, at the present time, in subjecting the great majority of cases of primary tuberculosis of one kidney to surgical operation.

There are certain characteristics of a tuberculous infection in a kidney that make the condition amenable to surgical treatment. Most of these cases, according to Heiberg, are primary in the kidney itself. Another factor that suggests the advisability of operating on these cases is the fact that many times a tuberculosis is limited to one kidney only. This proved to be the case in two hundred and sixteen out of three hundred and fifty of these patients observed by Rosving.

Complete removal of the kidney and a portion, or all, of the ureter, is positively indicated if the tuberculous infection is limited to one kidney, or if one kidney is extensively involved in the process and the other shows only a very slight infection. The results following nephrectomy in cases of this character are sufficiently good to warrant us in advising this operation.

Although it is true that most cases of tuberculosis of the kidney should be operated upon at the time the patients present themselves for treatment, many times it will be found inadvisable to remove a tuberculous kidney.

It is unwise to do a nephrectomy if the urea is diminished to one-third below the normal amount.

Nephrectomy should be advised against if both kidneys are extensively involved, if there is extensive tuberculosis in other parts of

the body, or if the entire genito-urinary tract is the seat of an active tuberculosis.

Nephrotomy, recommended by Guyon as a curative measure for tuberculosis of the kidney, is not to be advised. The same is true of partial resection of the kidney, followed by drainage, curetting and medication. These measures will rarely, if ever, secure a permanent result. Facklam has given this procedure a trial in ninety cases, and secured only one permanent cure. These measures may be advised as palliative operations in cases in which removal of the kidney is contraindicated. It is possible that some benefit may come from drainage in extensive tuberculous involvements of both kidneys, or it may be advisable to drain an extensively involved kidney when the fellow organ is in comparatively good condition. These operations of incision and drainage may occasionally be resorted to to prepare a patient for a later removal of a kidney. As a rule, however, a patient suffering from tuberculosis of the kidney presents an indication for the removal of the diseased organ, or the condition has advanced to such a degree, and is associated with such extensive tuberculous processes in other portions of the body, that no operation is justifiable.

MOVABLE KIDNEY.

While it is true that a movable kidney is usually considered good cause for operative treatment, not all of these cases should be subjected to surgery.

It is generally agreed that a floating kidney that produces definite attacks of pain, or repeated attacks of Dietl's crises, presents a positive indication for operative treatment. All of these cases should be subjected to fixation of the kidney, regardless of the amount of displacement and regardless of the severity of the attacks. It is not necessary that retention of urine should accompany the attacks of pain, neither is it necessary that evidences of kidney degeneration should be present. Fixation of the kidney in these cases is an operation that is practically safe, and good results can be expected in every case in which the attacks of pain were referable to the kidney and the kidney is distinctly movable.

According to Israel the cases that correspond to the foregoing description are the only ones that should be subjected to nephropexy. It is probably true that this advice is too conservative and that many cases of floating kidney can be operated upon successfully when the

train of symptoms described as Dietl's crisis do not occur. It has been stated by Goelet and others, for good reasons, that a kidney that is sufficiently movable to admit of distinct palpation of its upper pole below the costal margin, anteriorly, will in due time undergo degenerative changes. It is probable that fixation of the kidney is indicated in these cases of prolapse of the third degree in order to preserve the secretive structure of the organ. As a rule these observations have been disregarded and very few operations for floating kidney have been performed unless the patient has complained of symptoms. It is reasonable, however, to accept the advice of Goelet, and to prevent degenerative changes of the kidney by fixation of the organ whenever a prolapse of the third degree is recognized. Although we feel reasonably sure in advising operation in cases of movable kidney in which the symptoms can be referred distinctly to misplacement of the organ, we are many times in doubt regarding the advisability of doing operation in cases in which the kidney is displaced but the patient complains of general abdominal symptoms, a train of symptoms ordinarily described as nervous dyspepsia, with a certain amount of anemia, and definite neurasthenia. If these cases are associated with general enteroptosis no operation should be performed until an abdominal support has been given a trial and internal medication resorted to. If these measures do not give relief, and the abdominal pain can be brought on by injecting the displaced kidney, nephropexy is positively indicated.

If a movable kidney is associated with marked neurasthenic symptoms, or with hysterical attacks, operation should not be done unless it can be determined with a reasonable degree of certainty that the nervous symptoms are secondary to the displaced kidney and more or less dependent upon it, and that the floating kidney is not an accidental finding in a patient who is primarily a neurasthenic.

If a kidney is movable to a moderate degree, but the patient's general complaint is from the so-called dyspeptic symptoms, it is not probable that the kidney has been responsible primarily for the complaints of such patient. In these cases, however, the occurrence of a chronic appendicitis, or subacute or chronic conditions of the gall bladder that have been shown by Edebohls, Litten, Riedel and others to be produced by a movable kidney, are responsible for the symptoms complained of. In such cases nephropexy, associated with removal of the appendix, and with operation on the gall bladder, should

be performed. Replacement of the displaced kidney cannot be expected to relieve the symptoms of a chronic appendicitis and a chronic cholecystitis that, while they have been produced by the movable kidney, are capable of existing after the kidney has been replaced, and are also capable of producing most of the symptoms from which the patient complains.

An operation for the relief of a movable kidney should not be undertaken in a neurasthenic patient unless it can be clearly proved that the neurasthenia is not independent of the displaced organ. While it is true that a patient who is primarily a neurasthenic may have a floating kidney, and that the kidney may produce part of the symptoms from which the patient complains, the results from operations done on these patients has generally been unsatisfactory. If we are unable to control the neurasthenia we will probably not be aided materially by adding to our treatment a fixation of the kidney.

The association of floating kidney with many disorders of the female pelvic organs renders the indications for nephropexy difficult in many cases. It is usually unwise to perform an extensive pelvic operation and a nephropexy on the same patient at the same time. For this reason, before either of these operations are undertaken, it should be determined that the kidney is or is not the primary factor in producing the symptoms, and the operation of course will depend upon this decision.

While at the present time it is impossible to lay down indications for nephropexy in certain cases that complain of dyspepsia or of nervous symptoms, and we should keep in mind that many unnecessary operations have been done upon the kidney, yet coincidentally we should never lose sight of the fact that, as McGregor has said, true and long-standing dyspeptic symptoms may be dependent upon displacement of the kidneys and that a typical neurasthenia can and does depend entirely upon a nephroptosis.

BRIGHT'S DISEASE.

Decapsulation of the kidneys has been recommended and practised for the relief of chronic interstitial nephritis. At this time it is difficult to state positively whether the results, in some cases, do or do not justify the operation. The opinion prevails, however, that we should limit the operation of decapsulation of the kidneys to cases of edema of the kidney, marked tension of the kidney capsule, and certain con-

ditions resulting from injuries and displacements; and that a patient suffering from a true, long-standing, chronic interstitial nephritis in which, as Greenfield has shown, there are early destructive changes in the parenchyma of the kidney, should not be advised to have the operation done.

It is generally agreed that chronic interstitial nephritis is associated with general changes throughout the body, and that there is a destruction of part of the secreting structure of both kidneys. Unilateral chronic interstitial nephritis does not occur as a permanent, serious, clinical entity. Litten, Talma, Werra and others have shown conclusively that the secreting tissue of the kidneys is not capable, under any condition, of regeneration to any extent. Van Cott has shown experimentally that stripping the capsule from the kidneys in healthy animals is followed by the formation of a firm, cicatricial capsule containing only capillaries in the place of the anastomosing vessels in the normal capsule, as described by Koelliker, and that the cortex of the kidney shows positive evidences of degeneration instead of regeneration. The statements of Tuffier, Kummel and others, that a compensatory regeneration occurs in the parenchyma of a diseased kidney that has been decapsulated, has been conclusively disproved by Ribbert, Barth, Marchand, Litten, Van Cott and others. Theoretical observations clearly indicate that decapsulation can do no good in chronic interstitial nephritis.

Clinically, we are asked to believe many contradictory statements. The cases of Israel, Harrison, and Pousson are clearly not cases of chronic interstitial nephritis. The reports of Edebohls and Ferguson are not at once convincing when we remember their positive statements about unilateral chronic interstitial nephritis. On the other hand, the reports of unbiased medical men show us that we should not expect good results from operating upon cases of unquestionable chronic interstitial nephritis. Elliott has collected seventy-six cases of chronic interstitial nephritis that were treated by decapsulation, with the following results: Thirty-six deaths in a very short time; twenty-six cases temporarily improved; two cases rapidly failing, and no case that showed local or general evidences of being cured. Suker's carefully studied and quite complete list of cases shows nothing but absolute and complete failure when decapsulation is done in cases of chronic interstitial nephritis showing unmistakable eye changes.

The foregoing theoretical and clinical facts strongly suggest that

the time has come when every physician and surgeon should advise against renal decapsulation in all advanced cases of chronic interstitial nephritis.

HYPERNEPHROMA.

The treatment of hypernephroma is surgical. This statement has been generally accepted since Growitz, in 1883, recognized the character of these growths, and it is quite improbable that any form of treatment will supplant surgery in these cases.

Hypernephromas should be operated upon as soon as the diagnosis is made. It is not necessary that the growth should produce symptoms before the operation is done. Early removal of these tumors offers the best chance for securing a permanent cure. The fact that these growths progress rapidly after they once produce definite symptoms, terminating the life of the patient, according to Ramsay and Pfahler, usually within a period of two years, impresses us with the fact that early operative treatment is positively indicated. Although it has been admitted, from a study of the reports of Israel, Beneke and Askanazy, that occasionally a case of hypernephroma may live for a number of years after the tumor has been definitely located, these instances are mere exceptions to the rule and offer no excuse for delaying operative treatment.

If operation has been decided upon for the relief of a hypernephroma it will rarely happen that the kidney can be saved. Although there are a few instances on record of the existence of a hypernephroma not involving the kidney structure itself, they are extremely rare and on account of the difficulty, or impossibility, of diagnosing them at an early date, it is probable that operation for the removal of a hypernephroma cannot be successfully performed without sacrificing the kidney. If an operation is performed before the growth has involved the true structure of the kidney itself it is probable that some of the matrix would be present under the capsule of the kidney and it would be unwise to leave the organ if this were the case. According to the reports of Ellis and others, who state that the kidney itself is involved in ninety-six per cent. of the cases of hypernephroma, any operation that can be depended upon to relieve these patients permanently must remove the kidney.

While it is true that operative treatment offers the only hope for curing patients suffering from hypernephroma, no operation

should be undertaken if the existence of metastasis can be determined. If the growth has advanced to such a degree that it has involved portions of the body outside of the kidney, or if independent hypernephromas are present in the genito-urinary tract, no radical operation could be expected to give relief and of course should not be undertaken.

XV. THE URETERS, BLADDER, PROSTATE AND SEMINAL VESICLES.

THE URETERS.

Although the surgery of the ureters is difficult from the standpoint of technique and the results following operations not always satisfactory, the indications for operative treatment in injuries and diseases of the ureters are well understood. Most of these lesions are mechanical in character and can be relieved only by surgical means.

Accidental or operative wounds of the ureters indicate surgical repair. A division of a ureter occurring as an accident during hysterectomy, is perhaps best treated by implanting the ureter into the bladder. A vaginal cystotomy should be made and a forcep pushed through the bladder wall from within outward. The ureter should be grasped and drawn into the bladder. Its end should be split and the portions of the ureter should be turned back against the inner wall of the bladder and sutured to the vesical mucosa with catgut.

Longitudinal or transverse wounds of any portion of the ureter indicate repair by operation. Longitudinal wounds should be sutured, while lateral anastomosis should be the method of choice in dealing with complete transverse division of the ureter. If more than one inch of a ureter is destroyed or must be resected, ureteral anastomosis, or implantation of the ureter into the bladder cannot, as a rule, be accomplished. If the loss of the ureter occurs at the lower end, a vesical diverticulum may be attempted to aid in implanting the ureter into the bladder.

Stricture of the ureter presents an indication for operation if the stricture is of small caliber and cannot be dilated by the introduction of sounds. Incision of the stricture, or even resection, is indicated in relieving these cases. A hydronephrotic kidney, dependent upon a stricture of the ureter, should never be dealt with by nephrectomy, but presents an indication for direct mechanical treatment of the diseased ureter.

Stones impacted in the ureter should be removed by exposing the site of the impaction and incision of the canal, followed by closure of the wound after the stone has been removed.

In all operations upon the ureters the extra-peritoneal method

should be used, if possible. This is especially true in dealing with conditions associated with infection. It is a wise procedure to provide drainage down to the wound in the ureter.

It is possible, in some instances, to perform extra-peritoneal operations on the ureters without the use of a general anesthetic. A few of these tedious and prolonged operations have been done under local infiltration anesthesia. It is probable, in most of these operations, that the use of a general anesthetic will be advisable, and that local anesthesia will be resorted to only in exceptional instances.

THE BLADDER.

INJURIES TO THE BLADDER.

An injury that ruptures the bladder presents an indication for operative treatment in all instances. If these cases are seen early, the vesical wound should be closed at the primary treatment.

EXTRA-PERITONEAL RUPTURE OF THE BLADDER.

The operative treatment that is indicated in these cases should accomplish closure of the bladder. This is all that is indicated if these cases are seen shortly after injury has occurred. If, on the other hand, complications, such as infection or extensive extravasation of urine, have developed, the indications for treatment are modified or may be entirely changed. In all cases of extravasation drainage is positively called for. If infection is not present the wound in the bladder should be repaired, regardless of the time that has passed since the injury occurred. In cases of extra-peritoneal rupture of the bladder complicated with infection little will be gained in attempting to repair the bladder wound before the infection has, at least in part, subsided. In these cases efficient drainage should be provided for at the primary treatment, and repair of the vesical wound should be undertaken only after the infection has subsided.

INTRA-PERITONEAL RUPTURE OF THE BLADDER.

At the present time we are justified in operating upon all cases of intra-peritoneal rupture of the bladder, provided the patient is not practically moribund from acute peritonitis, or serious associated injuries are not so extensive as to render operation inadvisable and useless.

Previous to 1883 intra-peritoneal rupture of the bladder was con-

sidered a fatal condition, not amenable to operative treatment. In 1883 the work by Rivington stimulated operators to attempt to relieve these patients by surgery, and during the year McCormick operated to repair an intra-peritoneal rupture of the bladder. In 1888, and the years following, Grant and others performed operations for this serious injury. Since then the success of the operative treatment of intra-peritoneal rupture of the bladder has been generally recognized; and owing to improved technique, early diagnosis and early operation, the mortality for this serious injury has been progressively diminished. Previous to 1893 more than 67 per cent. of these injuries terminated fatally. Since 1893 not more than 27 per cent. of these cases have succumbed. Death, in cases of intra-peritoneal rupture of the bladder, occasionally results from shock and from associated extensive injuries, but as a rule peritonitis terminates the life of the patient.

A consideration of the nature of intra-peritoneal rupture of the bladder, the complications, and the outcome that may be expected if operative treatment is not resorted to, and the mortality of the operated cases, shows conclusively that early operative treatment offers the only chance of relieving these patients; and the outcome of the case depends entirely upon the extent of the associated injuries and the promptness of operative measures.

The operation in these cases should consist of laparotomy, closure of the bladder wound and drainage of the peritoneal cavity. Washing of the peritoneal cavity is indicated before a diffuse peritonitis has developed, but is of little value if a general peritoneal involvement is present at the time operation is performed. Drainage of the peritoneal cavity is positively indicated in treating all cases of intra-peritoneal rupture of the bladder, regardless of when the operation is performed, and regardless of the presence or absence of peritonitis. Temporary drainage does not materially prolong convalescence, while it assists in preventing peritonitis and saves the life of the patient if the repaired bladder wound leaks. While it is probably good practice to introduce a retention catheter in these cases, this has not always been done, and continuous drainage of the bladder is not positively demanded in the post-operative treatment of all of these cases.

It appears to be good practice, in dealing with all wounds of the bladder, to drain down to the vesical suture line. Little is lost if it

is found that the drainage has been unnecessary, while much will be gained if drainage is provided for should the vesical wound reopen.

ACUTE CYSTITIS.

Acute inflammations of the bladder rarely require operative attention. In almost every instance this condition is secondary; and while many times surgery may be indicated to relieve the pathological processes that are responsible for the cystitis, operation on the bladder itself is rarely necessary in acute, vesical inflammations. Non-operative measures usually succeed in curing an acute cystitis, or in diminishing the inflammatory process to such a degree that it becomes subacute or chronic.

CHRONIC CYSTITIS.

Chronic inflammations of the bladder are, in almost every instance, secondary. In some of these cases the condition appears to be a primary affection, but in most of them the primary pathologic changes that induced the cystitis have resolved and left the bladder involvement as the sole cause of the symptoms, and make the case appear as one of primary cystitis.

Chronic, serious inflammations of the bladder, that refuse to resolve after the predisposing causes have been efficiently dealt with, and do not yield to internal medication and local treatment, present indications for operation. Continuous drainage of the bladder, either vaginal, perineal, or occasionally, suprapubic, is the operation of choice in dealing with chronic, resistant inflammations of the bladder. This operation not only removes infectious material from the bladder, but gives the organ complete rest. If the bladder changes are of long standing and have resulted in marked thickening and disorganization of the vesical mucosa, curettage is indicated. This procedure is productive of good results if done in properly selected cases.

TUBERCULOSIS OF THE BLADDER.

Primary tuberculosis of the bladder is a very rare and serious affair. Many times a tuberculosis of the bladder is considered as a primary affection and is treated as such, for a considerable period of time, when the primary foci are not in the bladder at all, but later are shown to have existed in the other genito-urinary organs, in all probability previous to the occurrence of vesical symptoms. On account of the indefinite reports and discussions on this subject I am

unable to make statements with any degree of positiveness, regarding the indications for surgical treatment in this class of affections. The opinion may be expressed, however, that complete and prolonged rest of the bladder is the most efficient treatment for tuberculous involvement. The condition is such a serious one that we are justified in placing the bladder at rest by continuous and prolonged drainage as soon as a primary tuberculosis is diagnosed. If the irrigation treatment, or the treatment by curetting, as recommended by Guyon, or the local application of chemical substances to tuberculous ulcerations, is of benefit when a bladder does not drain properly, and is not at rest, these surely should be more efficient when drainage is complete and when the organ is functionless.

In cases of secondary tuberculosis of the bladder, or in cases affected with a primary vesical tuberculosis in which it is inadvisable or undesirable to perform an operation for drainage of the bladder, the treatment recommended by Hoffman, which consists of injecting five to eight ounces of a mixture containing one part of iodoform in twenty of vaseline, may be given a trial. If a patient with a vesical tuberculosis suffers with severe pain, or from unusual frequency of urination, and at the same time vesical drainage is inadvisable, or cannot be performed, repeated hydraulic hyperdistention of the bladder may be practised. Battle has used this method with success, and he is of the opinion that it is very efficient in giving these patients temporary relief from most of the distressing symptoms accompanying a vesical tuberculosis.

FOREIGN BODIES IN THE BLADDER.

The presence of a stone, or other foreign body, in the bladder presents a positive indication for removal. The method of removing foreign bodies from this viscus depends upon the character and size of such foreign body, the presence or absence of infection and the choice of technique of the operator. One should provide for drainage of the bladder after the removal of foreign bodies associated with infection, either by perineal or suprapubic cystotomy. Cystotomy is to be preferred to removal of stones through the urethra, in all but exceptional cases.

VARICOSE BLADDER.

In cases of severe, prolonged and repeated hemorrhages from the bladder, in which the origin of the hemorrhage is obscure or cannot

be determined, the existence of varicose veins of the bladder must not be lost sight of. Cystotomy is indicated in cases of uncontrollable vesical hemorrhage; and if large varicose veins are present, bleeding points should be ligated and large venous trunks should be divided and tied.

TUMORS OF THE BLADDER.

Benign vesical growths that produce symptoms should be removed. The operation that is indicated in these cases depends upon the character, size, and the location of the growths. Vaginal or suprapubic cystotomy should be the operation of choice in removing these benign vesical tumors.

CARCINOMA OF THE BLADDER.

Cancer of the bladder presents, as a rule, indications for either radical or palliative operative measures. If a primary carcinoma is limited to the bladder, radical operation should be attempted. Vesical resection, or complete removal of the bladder with the implantation of the ureters into the vagina or on the abdominal wall, or dealing with them according to the method of Maydl, is perfectly justifiable. These operations are contraindicated only when the general condition of the patient is very much below par, or when metastatic tumors can be recognized.

Secondary carcinoma of the bladder, as a rule, presents indications for palliative operation only. The chances of permanently curing these patients are so small, and the immediate mortality of the operation is so great, as to render the radical operative treatment of secondary cancer of the bladder unjustifiable in almost every instance.

SARCOMA OF THE BLADDER.

Operative treatment is many times indicated in cases of sarcoma of the bladder, either to produce a permanent cure or as a palliative measure. The radical cure of sarcoma of the bladder will rarely be undertaken. This disease is so rare in occurrence, the diagnosis so difficult to make, and recurrence so common, that the operative treatment of these cases is not usually followed by permanent results. Of fifty cases of sarcoma of the bladder collected from the literature there is only one case that was well one year after the radical operation had been performed. In all of the others a fatal issue followed

operative treatment in a comparatively short time. It is true that the cases operated upon by Paget, Whitehead, Langton and Schlegel appeared well when they passed from observation, but on account of the very short time that these patients were observed after the radical treatment had been instituted, it is entirely probable that most of them succumbed to early recurrence. It is possible that the case of Stankiewicz, which remained well one year after the radical operation had been done, did not have a recurrence. If this patient was permanently cured it is, in all probability, the first case of sarcoma of the bladder that has been treated successfully.

Palliative operations, consisting in drainage of the bladder, may be necessary to relieve patients suffering from advanced sarcoma of this part. These operations cannot be expected to give more than temporary relief.

While, at the present time, the radical treatment for sarcoma of the bladder has not been followed by satisfactory results complete removal of the growth should be attempted in all cases in which from the examination, the duration of the symptoms, and the size of the tumor there is reason to hope that a recurrence would not follow complete removal of the growth. While most of these cases will die, either from the operation or from speedy recurrence, this is the only method of treatment that offers, at the present time, any possible hope of cure.

THE PROSTATE GLAND.

HYPERTROPHY OF THE PROSTATE GLAND.

Although there has been considerable discussion concerning the time at which it is advisable to subject prostates to surgical interference, there is apparently no question regarding the advisability of performing *early* operations on these cases. If the condition has advanced sufficiently to produce symptoms it is only a question of time until the symptoms increase in severity, or complications of a serious character occur. It is a mere exception to the rule that a patient who has a prostatic enlargement sufficiently severe to cause him inconvenience will escape from a palliative or radical operation. This is especially true if the patient does not succumb in a short time after the onset of his prostatic symptoms. Another reason for advising early operation to these cases is the fact that the mortality

in uncomplicated cases is practically nothing, while if the condition is allowed to advance and serious complications supervene, radical operation, or even palliative measures, become very serious. The time has come when no surgeon or general practitioner can afford to delay radical treatment in cases of prostatic hypertrophy until the local and general conditions have advanced to a stage that renders the operative treatment a serious consideration.

The size of the prostate gland is no indication for or against advising radical operation. It was shown long ago, by Keyes and others, that prostatic symptoms of great severity might and do occur without any enlargement of the gland. Albarran operated on nine cases of prostatism in which there was no enlargement of the gland. Motz and Arrese operated on fifteen cases of prostatic obstruction and infection in which no enlargement of the gland was present. These citations and the experience of other operators show plainly that the size of the gland cannot be relied upon as an indication for or against operative treatment, or as an index to the severity of the symptoms, or the occurrence of complications. There is no doubt that a small prostate may present as positive an indication for operation as would one that is greatly enlarged. On the other hand it is equally true that a very large prostate may not produce obstructive symptoms, pain, undue frequency of urination or other evidences sufficiently severe to warrant operative interference. The size of the gland is absolutely no indication of the *severity* of the symptoms.

The indications for operative treatment in cases of prostatic hypertrophy depend entirely upon the symptoms and the complications that are present. These are so many and vary so much in severity and intensity that it is impossible to lay down definite rules for surgical interference that are based on the occurrence of one or more symptoms, and yet there are certain symptoms and conditions that present positive indications for operative interference. Daily catheterization, according to Harwitz, presents a positive indication for radical operation in all cases. If the symptoms of prostatism have advanced to such a degree as to require continual catheterization, it is only a matter of time until complications occur that demand operation and that render the operation of a more serious character. Acute or chronic infections invariably occur after daily catheterization has been practised.

Infection is the all-important consideration in prostatic hyper-

trophy. It is responsible for most of the serious symptoms of these cases; it is responsible for nine-tenths of the suffering, and in the great majority of instances it is infection that terminates the life of the patient. Infection is such a serious matter, occurs so frequently, and may result so seriously, that it presents a positive indication for drainage in all cases, and radical operation in those patients in which the general condition is sufficiently good to warrant the performance of an operation. Chronic infections of the bladder do not present so important a call for interference as do acute infections. On the other hand the chronic process is productive of serious permanent changes in the bladder, and possibly in other organs, and very often presents as positive an indication for operative interference as do the more serious and acute infective conditions.

Another indication for radical operation is repeated hemorrhages. If a prostate is in such a condition that it produces repeated and sometimes serious bleedings, radical operation should be done without delay. Although it is possible that operations on the testes, or vasa deferentia, may be sufficient to control the hemorrhage, they are not sufficient, in the great majority of instances, to relieve the cause of the symptoms, and should not be advised in the treatment of hemorrhage.

Although the great majority of patients who present themselves for operative treatment for prostatic hypertrophy afford symptoms and findings that offer positive indications for operation, it not infrequently happens that patients presenting symptoms that are not sufficiently severe to demand operative treatment will ask for advice regarding a radical operation. Frequency of urination is not a positive indication for operative treatment in itself; if it becomes distressing, shows no periods of improvement, and seems to exhaust the patient, it is then a symptom of sufficient severity to warrant an operation. Severe pain is another symptom that may at times present a sufficient indication for surgical interference. Another symptom that may be considered a reliable indication for operation is occasional urinary obstruction. If the obstruction is of short duration and is followed by no symptoms of infection, no operation would be indicated. On the other hand if the patient complains of frequent attacks of urinary obstruction surgical treatment should be advised, even if no infection has occurred and the obstruction has only been temporary.

The performance of radical operations for the relief of prostatic hypertrophy when symptoms and findings offer only relative indications for radical treatment, should be more frequently resorted to. These patients are usually in good physical condition, they are free from infection, and their urinary expelling powers are not commonly impaired; they offer good risks for the radical treatment which, in all probability, they must submit to sooner or later. Early operation should be the choice in treating these patients. The fatal results that occur so often with every method are, in most instances, due to the low condition of the patient, to the presence of infection, and to delay in seeking relief. The opinion is ventured that we shall make no mistake if we advise and perform radical operation on all prostatics that show symptoms described in the foregoing as presenting only relative indications for the radical operation.

The Operation of Choice.—So much has been written by good men, both for and against the various operative procedures for the relief of prostatic hypertrophy, that it is impossible, as well as inadvisable, to consider the various discussions in detail, or to attempt to show from the reports of operated cases, or experimental work, that one operative procedure should be employed in all cases, or presents especial advantages over all others. From the quite careful and extensive study of the experiences and researches of others, I am of the opinion that only two operative procedures are of sufficient value to warrant discussion in the treatment of prostatic hypertrophy and its most frequent and serious complications. If a prostatic is in sufficiently good condition to withstand a general anesthesia, or a moderately severe operation, partial perineal sub-capsular prostatectomy should be advised at once. If the conditions have advanced to such a degree that there is reason to believe the performance of this operation would result seriously, perineal drainage of the bladder should be done as a palliative measure. The sub-capsular enucleation of the prostate, as advised and practised by Goodfellow, Syms, Van Hook and others, is an efficient and safe procedure for relieving the symptoms of enlargement of the prostate gland and its complications. This operation, if properly and quickly done, is attended with very little shock, the loss of a small amount of blood, and can be accomplished in a very short time. It meets the pathological indication by removing the obstructing gland; by obliterating the retro-prostatic pouch, and, most important of all, drains the bladder efficiently at its lowest point.

If the condition of the patient is such that general anesthesia is contraindicated, or spinal anesthesia cannot be employed, or if there is reason to believe that even rapid enucleation of the prostate would be followed by severe depression, perineal cystotomy, under local anesthesia, should be done. This efficiently drains the bladder and relieves the infection which, in the great majority of instances, is responsible for the serious local symptoms and for the emaciated and anemic general condition of the patient.

Complicated and prolonged operations, advised and done by Albarran, Proust, Young and others, present no advantages over the sub-capsular enucleation. The local injury to the surrounding tissues is more severe than would accompany the sub-capsular operation: the general symptoms and loss of blood are also more serious; the length of time required to perform the operation, which is an important consideration in treating these patients, is unnecessarily prolonged in doing the operation according to the method that these men have described. There is no good reason why sub-capsular enucleation, or morcellation, if necessary, should be replaced by any more extensive procedure. It meets the indications thoroughly and can be quickly done.

Suprapubic puncture, as a palliative measure, has been recommended and practised with success. Relief, however, is only of short duration. If it is impossible to do a palliative operation a suprapubic puncture may be advisable. If a puncture is made drainage of the bladder should not be delayed if infection is present.

Other Operative Procedures.—Vasectomy, recommended in 1894 by Maers, Bruns and others, has no place in the treatment of prostatic hypertrophy to-day. It is true that this procedure has some times given temporary relief; in the great majority of instances, however, the results are not permanent and the operation will be found valueless. It has been shown that if the prostate is soft, spongy and hyperemic, and bleeds, vasectomy may give partial, or even complete, relief. It has been shown also that if a prostatic is subject to frequent attacks of orchitis, vasectomy will be of value in preventing the occurrence of this complication. As a rule, however, little relief can be expected from this procedure, and as it is not without danger, as has been shown by Woods, who reported a mortality of twelve per cent., it should be discarded and replaced by the radical operation, or by palliative drainage.

Castration, recommended by White in 1893, is a more serious procedure than vasectomy, and cannot be depended upon to give more satisfactory results. It has no place, at the present time, in the treatment of hypertrophy of the prostatic gland.

Ligation of the internal iliac arteries, recommended by Biers in 1895, has been discarded for good reasons. It does not meet the pathological indications, and is a serious procedure to be considered.

Prostatopexy, recommended by Delangeriere (fixation of the gland in a new position, after freeing it by incision, and dislocation of its lobes downward) has not met the indications for treatment. Good results will doubtless be obtained by this method in certain selected cases, but as the hypertrophied gland is not removed, this operation cannot be compared with prostatectomy.

Operations that elevate the base of the bladder, practised by Hallie, Dittel and others, may be sufficient in certain cases, but should be discarded for various reasons. It is undoubtedly true that elevation of the base of the bladder assists the organ in emptying itself. Goldman has performed ventro-vesico fixation with success in several cases. He was led to perform this operation on account of the marked improvement that was observed in some patients who had been subjected to repeated suprapubic punctures. The adhesions in these cases resulted in an elevation of the bladder. Rydygier's assistant observed this many years before Goldman, Hallie and others. He also performed fixation of the bladder, but so far as known did not publish a detailed account of his operations, or of the results.

The infrapubic operation, advised by Andrews in 1902, although efficient in some cases, cannot be compared with removal of the gland. It will doubtless seldom be performed. It is perhaps more serious than the sub-capsular removal, and, at times, it does not efficiently meet the pathological indications.

Continuous drainage of the bladder is to be highly recommended as a palliative procedure. This operation should not be done except as preparatory treatment to the radical operation, or in cases in which the general condition of the patient is so serious as to contraindicate the performance of enucleation. When drainage of the bladder is to be done, the perineal route offers the best results. It is as easily and as quickly performed as the suprapubic operation and it drains much more efficiently. Drainage should not be employed with the idea of obtaining complete relief. Sir Henry Thompson has shown

that long continued drainage may be of value in some cases. He reports one patient who remained in perfect comfort for fourteen years after a suprapubic drainage had been done. Harrison has called attention to the fact that prolonged benefit may follow continuous drainage of the bladder in many of these cases. Although it is well known that good results occasionally follow prolonged drainage of the bladder, this operation should not be done with the idea of producing a cure of the patient. Its only place, in my opinion, is to relieve serious infections and to prepare the patient for the removal of the gland.

The Bottini Operation.—The operative procedure recommended by Bottini, and later modified by Freudenberg and others, has given very satisfactory results in some cases, and has not been followed by a large mortality. The time has come, however, when the Bottini operation should be discarded and should be replaced by prostatectomy, or by palliative drainage. The procedure is uncertain and its results are by no means constant. It should be replaced, according to Syms and others of large experience, by an operation that more clearly meets the pathological indications. It would seem that there is no indication for the performance of a Bottini operation in any case of prostatic hypertrophy. Many will take exception to this statement, believing as they do that the operation should not be discarded entirely, but should be retained to relieve a certain class of patients, who seem unfit subjects for the more radical operation. Meyer is of the opinion that debilitated patients, who seem unfit subjects for the more radical operation, should be advised to have Bottini's operation done, but experience has taught that most of these cases are suffering from infection. The Bottini operation does not meet the indications for infection, and should be replaced by perineal drainage of the bladder, which is a less serious procedure and more clearly meets the immediate and remote indications.

Although it is probable that many operators will continue to employ the Bottini method for some time in certain selected cases, it is seldom possible to receive good results from this operation if infection of the bladder has occurred. Although I am unable to determine from the reported cases operated on by this method that infection was an important factor in the results obtained, I am of the opinion from the cases that I have observed personally that a good result is very seldom, if ever, obtained by the Bottini method if an infected bladder

is present. The Bottini operation should be advised against in all cases in which an acute, or a well marked chronic, cystitis is present. When the operation is done on patients suffering from no serious infection we can expect good results in a certain number of cases. Complete failures, however, occur in a sufficiently large number to contraindicate it unless done in certain selected cases only. The experience of L. B. Bangs fairly represents the work that has been done along this line; he reports twenty per cent. of failure following all cases treated by this method. Another objection to the Bottini method is that even though satisfactory results may be obtained for a time they are not permanent. Weir tried the method twenty-five years ago and discarded it for this reason. Although his immediate results were fairly satisfactory, the remote results, in his opinion, contraindicated the operation. Recurrence of the symptoms is the usual course in patients who have been subjected to the Bottini operation. The fact that the symptoms recur, of course would not contraindicate the performance of the operation; the procedure could be repeated at intervals. These conditions, however, added to the danger of the procedure, are sufficient to justify us in replacing the Bottini method by the radical removal of the gland. Harwitz reports the deaths from the Bottini operation as amounting to five and seven-tenths per cent. Serious complications may also be expected, according to Meyer, in twenty-two per cent. of the cases. These are usually infections, but may be fistula formations. Rosenstein has called attention to another danger that may accompany the Bottini operation. He observed that rupture of the bladder, caused by distension from gases formed by the heated instruments, may be expected to occasionally occur during this operation. Rosenstein carried out experiments on the cadaver that proved to him conclusively that rupture of the bladder, due to gaseous distension, could occur with sufficient frequency to warrant careful consideration in performing the Bottini operation. Although it is possible that the dangers and the mortality of the Bottini operation have been magnified, there is little reason to believe that subcapsular enucleation of the prostate is more serious than the Bottini operation. Murphy states positively that the Bottini operation is more dangerous than the perineal removal.

Suprapubic Method.—The suprapubic operation, advised by Belfield, McGill, Trendelenburg, Dittel and others, meets the pathological indications in that it removes the prostate. The objections to this

operation are that it is a more serious procedure than the perineal operation, and that the suprapubic drainage of the bladder is not efficient in cases associated with serious infections. The opinion is advanced that the suprapubic method should not be attempted in any case.

Combined Operation.—Operation by the suprapubic and perineal methods, as recommended by Belfield, Nicoll, Alexander, Bryson and Guiteras, gives the same result, so far as meeting the pathological indications, as does the perineal operation alone. By this method the gland is removed and efficient perineal drainage accomplished. The objections to this operation are that it is more serious on the patient, is more prolonged and is associated with more manipulation. The combined operation should not be performed unless it is found that it is impossible to remove the gland from below.

The perineal operation, that has been practised so extensively during the last few years, appears to be the ideal treatment for hypertrophy of the prostate gland. This operation meets the two important indications of removal of the gland and drainage of the bladder. It is not serious from the standpoint of the patient, and is not prolonged or difficult to perform. It should be advised in preference to all other methods except palliative drainage, which should be done only when the patient's general condition is so serious that the radical operation would be dangerous to undertake.

CANCER OF THE PROSTATE.

Carcinoma involving the prostate gland so rarely occurs, is so difficult to diagnose, so rapid in its progress and so unsatisfactory to treat that a discussion of the indications for its surgical treatment will be of little value. It is generally admitted that if a diagnosis of carcinoma of the prostate can be made at a reasonably early date surgical interference is positively indicated. A consideration of the pathology of malignant growths involving the prostate will convince one of the advisability of operating upon these patients. Engelhardt has shown that local extension of the carcinomatous process occurs late. Koufmann found that local extension of the growth had occurred in only fifty-seven per cent. of the fatal cases. For these reasons we are justified in advising operation for these patients, even if the condition is well defined. When it is remembered that carcinoma of the prostate gland occurred in from five to ten per cent. of all cases of

prostatic disease as shown by Green, Brooks, Albarran, Hallie and others, and that the condition, although serious and rapidly fatal, remains localized in the gland for a considerable period of time, we can recognize the importance of an early diagnosis and prompt radical treatment for these cases. If the disease, however, has advanced to a stage in which metastasis has occurred, or if it can be determined from the examination that the carcinomatous involvement has spread to the tissues outside of the prostatic capsule, no radical operation should be advised. Extensive and mutilating operations, removing the prostate, the rectum, portions of the bladder and other important structures, have no place in the treatment of prostatic cancer. A diagnosis should be made before the condition has advanced to a degree that would make such operations necessary. In arriving at a diagnosis of carcinoma of the prostate it must be remembered that although, in most instances, the condition is rapid and fatal, as has been shown by Pasteau, Billroth, Salerchio, DeLorne and others, the condition usually produces at the beginning symptoms and findings that are sufficiently characteristic to at least render its existence probable, if not positive. Greun has shown that carcinoma may be expected to occur in one of the lateral lobes of the gland in the great majority of instances. This observation should be of value in arriving at a diagnosis. Enlargement of the gland is not necessarily associated with the presence of a cancer. The carcinomatous process may be well advanced and the gland be atrophic. This has been shown by Frisch, Julian, Crechomoruski, Crandon, Reckling, Hansen and others.

Operation for Cancer of the Prostate.—If it has been decided that the performance of a radical operation for cancer of the prostate gland is advisable, the extra-capsular removal advised by Proust should be the method resorted to. This operation can be performed in a reasonable period of time; it is not associated with severe shock or loss of blood; and it meets the indications as well as do the more extensive procedures. The prostatic urethra should be removed with the gland in all cases. Sub-capsular enucleation of the prostate should never be recommended as a radical treatment for cancer of the organ. If the condition has not advanced beyond the stage that could be relieved by sub-capsular removal it is very improbable that a diagnosis could be arrived at. If the disease has progressed to a degree that renders diagnosis probable, the capsule of the gland will, in all prob-

ability, have been involved and should be removed with the glandular tissue.

The extensive and mutilating operative procedures recommended for advanced cases of carcinoma of the prostate are not justifiable operations. If the condition has advanced to the stage that would make this operation necessary no permanent cure can be expected, no matter how extensive an operation is performed. Removal of the coccyx, followed by extensive intrapelvic operation, as advised by Socin, the similar but perhaps more serious procedure advocated by Rydygier, and the extensive abdominal operation practised by Custer, should have no place in the treatment of cancer of the prostate gland. These operations are so serious in character, and the subjects on which they are performed are in such poor condition, that it is probable the majority of these patients would live longer without being subjected to these operations than if these measures are carried out.

Palliative operations may be advisable under certain conditions in advanced cases of cancer of the prostate gland. Suprapubic drainage has been recommended to relieve the obstructive symptoms in these cases. This operation meets the indications and according to Hallie should have the preference over the perineal drainage. If infection of the bladder is associated with obstruction I am of the opinion that perineal drainage should be employed in preference to the suprapubic operation. Severe pain may present an indication for a perineal removal of the carcinomatous prostate gland. Harrison has reported one case of this character. Although little can be expected by performing palliative operations on these patients, it may occasionally happen that sufficient temporary relief can be obtained by their performance to make them justifiable.

SARCOMA OF THE PROSTATE.

Although sarcoma of the prostate gland is a comparatively rare condition it may be occasionally expected to occur. According to Von Frisch and Belfield, one-eighth of all cases of prostatic tumors are carcinomatous. These cases present the same indications for operative interference as do cancerous involvements of the gland. As the great majority of them occur in early life it is possible that radical and serious operations can be more frequently undertaken for sarcoma of the gland than would be advisable if the diseases were of a carcinomatous nature. Advanced sarcoma of the prostate gland may

be present in a patient whose general condition seems fairly good; carcinoma of the prostate gland, that has advanced to any considerable degree, is most always found in a patient who is the subject of marked wasting and emaciation, and who is well advanced in years.

THE SEMINAL VESICLES.

The surgery of the seminal vesicles has not been practised extensively, and it is impossible at the present time to make positive statements regarding the efficiency of operative treatment in conditions involving these organs. We are especially indebted to Eugene Fuller, of New York, for valuable work along this line. From the reports of Fuller and others, and from personal experience, I am of the opinion that a great deal of good can be done in certain selected cases by surgical operation upon the seminal vesicles. The procedure is not dangerous and in the great majority of cases is followed by very satisfactory results, if proper cases are selected for treatment.

Acute suppurative seminal vesiculitis presents a positive indication for incision and drainage. The majority of these cases are of gonorrheal origin, and if they are allowed to remain result in a perivesicular abscess. If it can be determined that a localized collection of pus exists within the seminal vesicles, or that a perivesicular abscess has formed, incision and drainage should be advised at once. In cases of perivesicular abscess formation, drainage to the seminal vesicles will be insufficient. In these cases not only the perivesicular abscess should be opened, but a longitudinal incision should be made into the seminal vesicle. The reported cases that have been operated upon show that incision and drainage is positively indicated in acute suppurative conditions involving the seminal vesicle.

If it can be determined that a benign or malignant tumor involves the seminal vesicle this should be removed without delay. Fuller has removed successfully an adenoma involving one seminal vesicle. The same indications for treatment present themselves in cases of seminal vesicular calculus and malignant tumors. A chronic gonorrheal, or simple involvement of the seminal vesicle, will rarely require operative treatment for its relief. These cases should be subjected to prolonged massage and local treatment before advising incision. If there is reason to believe that a permanent cure cannot be effected by resorting to local measures, I am of the opinion that free incision and drainage should be advised without delay. Incision and

drainage is also indicated for recurrences, so common after local treatment has been applied. Although the great majority of these patients will not require operative treatment, occasionally one will present himself who will not be permanently or completely relieved unless an open incision is done. The results following the open method of treatment for these patients are very encouraging indeed. The seriousness of the operation is not great and we are justified in giving these patients permanent relief if less radical measures fail.

The operative treatment of tuberculosis of the seminal vesicles has been very unsatisfactory. In the great majority of cases of primary tuberculosis of seminal vesicles a diagnosis is not arrived at until secondary tuberculous foci have developed. Although it is possible that permanent relief can be given by performing early operations in these cases it is probable that the operative treatment for tuberculosis of the seminal vesicles will be rarely indicated, and will give, as a rule, unsatisfactory results. If it can be determined that along with the tuberculous process a mixed infection with suppuration has occurred, local drainage would be indicated to give partial and temporary relief.

The technique of operative procedures on the seminal vesicles has been well worked out by Fuller, and we shall do well to follow his method in the majority of cases.

XVI. THE TESTES AND PENIS.

MALFORMATIONS.

The various malformations and congenital defects of the male generative organs are surgical conditions. The indication for the treatment of these is well understood; and the technique of the various operative procedures recommended and practised for their cure has been elaborated in all operative surgeries. For these reasons, nothing will be said regarding the malformations of the urethra and penis, except to call attention to the fact that the importance of circumcision has been underestimated, and that the multiple and sometimes complex symptoms of phimosis are not fully appreciated.

UNDESCENDED TESTICLE.

An undescended testicle commonly presents a positive indication for surgical treatment. The hernia that is almost invariably associated with this condition, the pain that is not infrequently complained of, the fact that the displaced organ cannot develop in its abnormal location, the mental suffering that is invariably present when these patients have passed the age of childhood, and the probable development of a malignant growth of the displaced organ, offer a combination of indications that in almost every instance makes an operation for undescended testicle imperative. The indication for the surgical treatment of this condition is brought more forcibly to us when we consider that the operation is a safe one, that if properly done it is invariably followed by good results, and that it not only relieves the symptoms but allows the misplaced organ to develop when done at an early period.

Although as a rule an operation on an undescended testicle is indicated at any age, these cases should be operated, if possible, when the patient is from six to twelve years of age. It will usually be inadvisable to perform this operation on a child before he has passed the fourth year, and it is inadvisable to delay the operation until the age of puberty has been reached. The conditions for the operation are practically ideal when the child is from six to ten or twelve years of age. If the operative treatment has been delayed until the patient is advanced to adult life little can be expected in the way of development of the atrophic and displaced organ. The symptoms of pain

and the associated hernia may be relieved and prevented, but little else can be looked for if the operation is delayed until this late time.

Castration for the relief of an undescended testicle is an unjustifiable operation unless the organ is the seat of a malignant growth. Replacement of the displaced organ is entirely sufficient in the great majority of the simple cases. This can be done, it is believed, in every instance if the operation is properly carried out and the organ is thoroughly freed from the attachments that prevent its being put into a normal position. The attachments of the testicle from above should be entirely severed, with the exception of the spermatic vessels and the vas deferens. If, after this has been done, it is impossible to replace the testicle into its normal relation, there should be no hesitancy in clamping and severing the cremasteric vessels. This will no doubt in every case allow sufficient mobility of the testicle to make its replacement possible. The vas deferens should then be brought into the lower angle of the wound and should pass directly through the abdominal wall at the site of the external abdominal ring, instead of passing through the peritoneum and internal layers of muscle at the position of the internal ring. This displacement of the vas does not materially interfere with the efficiency of the operation in curing and preventing the occurrence of hernia that is so often associated with this condition. The division of the spermatic vessels should not be done unless it is evident that the organ cannot be replaced by leaving them intact. There is every reason to believe from the reports of operated cases and from experimental work that no atrophy or necrosis or lack of nutrition of the testicle can be expected to follow complete division of the cremasteric vessels in any case. The artery of the vas deferens which anastomoses freely with the cremasteric artery is entirely sufficient to nourish the testicle.

INJURIES.

Injuries to the male genital organs offer nothing unusual in the way of indications for operative treatment, except in cases of rupture of the urethra.

RUPTURE OF THE URETHRA.

Complete or traumatic, uncomplicated rupture of the urethra affords an indication for operative treatment, if retention of urine is complained of, or if urinary extravasation occurs.

If the patient is unable to urinate, and there is reason to believe, from the history of the case, that the urethra has been ruptured, catheterization should be attempted. If this fails and if vesical distension is marked, perineal urethrotomy is indicated. If no extravasation of urine is present and if it is inadvisable, on account of the patient's surroundings, or for other reasons, to do a perineal section, supra-pubic aspiration may be resorted to as a palliative measure.

Extravasation of urine complicating traumatic rupture of the urethra is a positive indication for immediate external incision in all instances. There are, so far as known, no exceptions to this statement. The operation in these cases should consist of exposure of the ruptured urethra, identification of the urethra proximal to the injury, the insertion of a retention catheter through the entire urethra into the bladder, suturing of the urethral wound, if possible, and drainage of the operative wound down to the injured urethra. In some instances, where the injury to the urethra has been well forward, continuous drainage of the bladder through a perineal puncture posterior to the injury in the urethra should be provided for.

If the operator finds it impossible to successfully carry out all of the foregoing procedures, simple incision and drainage down to the injured urethra, combined with suprapubic puncture, will meet the immediate necessities. When the bladder has regained its normal tonus, after being emptied by aspiration, the patient will urinate into the perineal wound. In cases treated in this manner urethral repair will be necessary at a secondary operation.

In cases of complete transverse rupture of the urethra it is difficult or impossible to locate the proximal portion of the canal. The sense of touch, obtained by rolling the urethra between the fingers is perhaps the most important and reliable means of locating the proximal portion of the urethra.

The advisability of suturing a completely ruptured urethra depends upon the extensiveness of the contusion of the tissues and the time that has elapsed before operation is undertaken. It is believed that it is a wise procedure to suture the urethra in all of these cases, although the suturing will do little good in some of them.

The advisability of resorting to retrograde catheterization when it is impossible to find the proximal portion of the urethra will depend upon the condition of the patient and the experience of the

operator. As has been stated in the foregoing, it is not necessary to locate the proximal portion of the urethra to give the patient complete, temporary relief.

The after-treatment in all of these cases should guard against entire closure of the perineal incision until the continuity of the urethra has been restored; and for some time after the patient has apparently recovered sounding should be resorted to in order to prevent stricture.

STRICTURE OF THE URETHRA.

Traumatic stricture of the urethra, in the major proportion of instances, presents a positive indication for operative intervention. If the injury to the urethral tissue has been extensive, or if it has been complicated by a serious infection, or if the stricture is of long standing, dilatation and non-operative methods cannot be depended upon to give complete relief. All long-standing, extensive or markedly narrowed traumatic strictures of the urethra, especially if they involve the bulbous or membranous portions, which is frequently the case, should be subjected to external urethrotomy without a prolonged attempt at relieving the symptoms, either by dilatation, electrical treatment or massage.

Strictures of the urethra resulting from inflammatory processes afford an entirely different indication for cutting operations than do traumatic strictures. If an inflammatory narrowing of the urethra is treated efficiently, and at a reasonably early date, it will rarely happen that a urethrotomy, external or internal, will be required. Most of these strictures, even if of small caliber, can be dilated successfully without serious injury to the patient and without unusual risk of complications occurring. It is not necessary that a cutting operation be performed for the relief of a stricture on account of the small caliber of the urethra. Many small calibered strictures are more easily and readily dilated than are a large number of extensive strictures in which the caliber of the urethra has not been greatly narrowed. Every inflammatory urethral stricture should be subjected to dilative treatment, provided it is possible to pass the stricture with any instrument. Full dilatation should never be accomplished at one sitting. Rapid dilatation of a stricture, with the patient under the influence of a general anesthetic, should never be undertaken if the cicatricial tissue is very resistant, if the stricture is of long-standing, or

if its caliber is extremely small. Divulsion under these circumstances is a dangerous procedure in itself and is likely to be followed by most serious complications.

INTERNAL URETHROTOMY.

Internal urethrotomy should seldom be done on a deep urethra. This statement is made unhesitatingly, although many men with extensive experience may dissent from this view. Notwithstanding their objections and in spite of the ardent advocates of this method it certainly seems that internal urethrotomy should be limited to the penile urethra. If there exists a stricture of the anterior portions of the urethra that resists, or cannot be successfully treated by, dilatation or non-cutting methods, an internal urethrotomy will relieve the condition, and in the majority of instances can be performed without injuring the patient, or without opening a field for serious infection or hemorrhage, or without subjecting the patient to the occurrence of serious complications. But one will find few cases of stricture of the penile urethra that resist non-cutting methods. Internal urethrotomy, however, has its legitimate field of usefulness, and if properly applied in carefully selected cases will be productive of satisfactory and quite permanent results.

EXTERNAL URETHROTOMY.

All cases of inflammatory stricture of the urethra, that have narrowed to such a degree as to render the inserting of any instrument impossible, present a positive indication for external urethrotomy. Operation, performed on cases of this character, may be difficult, but it always succeeds and fully meets the indication if combined with a suprapubic cystotomy. External urethrotomy is clearly indicated in all cases of inflammatory strictures involving the deep urethra that do not yield to treatment by gradual dilatation. It is also undoubtedly called for in cases of stricture of the deep urethra, associated with severe or long-standing inflammatory conditions in the bladder or in the prostate. This is especially true if the treatment by dilatation is extremely painful or is followed by urethral chills and fever of marked severity. A small, band-like stricture, resulting from the presence of an elastic ring of cicatricial tissue, situated usually at the junction of the bulbous and membranous portions of the urethra, will many times require an external urethrotomy, not so much to relieve the mechanical obstruction caused by the stric-

ture, but to effect a permanent cure of the chronic inflammatory condition existing behind this elastic cicatricial band. These cases usually yield promptly to the treatment by gradual dilatation up to a certain point, then the dilatation treatment, no matter how thoroughly or conscientiously it is carried out, fails to improve the condition. When the patient has arrived at this stage external urethrotomy is no doubt demanded, both to relieve the mechanical obstruction and to do away with the chronic inflammatory process that invariably complicates these strictures.

ACUTE EPIDIDYMITIS AND ORCHITIS.

These acute inflammatory processes are most often caused by gonorrheal infections. In the great majority of instances they present no indication for operative treatment. If the trouble results in suppuration, which is the exception and not the rule, incision and drainage are indicated.

ACUTE HYDROCELE.

Acute inflammatory processes involving the tunica vaginalis present no indication for surgical treatment, unless suppuration develops. If abscess formation occurs, incision and drainage are called for.

TUBERCULOUS EPIDIDYMITIS AND ORCHITIS.

Tuberculosis of the testis is a surgical condition in which a contraindication for operative treatment exists only when the disease has been of long standing and has progressed to such a degree as to render operation not only impracticable, but useless. The origin and progression of tuberculosis of the testicle indicate plainly the line of treatment. The tuberculous process, in almost every instance, has its origin in the epididymis. The vas deferens, testicle, seminal vesicle, bladder and other organs are affected secondarily from an extension of the infective process from the primarily diseased epididymis. The infection, in these cases, travels in the direction of the natural current from the epididymis to the bladder. It rarely ascends the ureters to involve the kidneys, and is slow to travel from the bladder to the opposite, uninvolved testicle.

When the tuberculous process is limited to one epididymis, it and the vas should be removed, the proximal portion of the vas cauterized, and the portion of the testicle apposing the epididymis should be touched with the actual cautery. If there is reason to believe that

the testicle is involved in the tuberculous process, but the existence of disease therein cannot be determined, an incision into the testis should be made along the mediastinum testis. If this incision shows that the testis is involved in the process the organ should be removed. Conservative operations on the testicle in cases of unilateral tuberculous disease should be discarded. The risk of recurrence overbalances the desirability of saving a portion of the organ, when the disease is unilateral.

It not infrequently happens that a case of tubercular orchitis presents itself for treatment only after the disease is well advanced and unmistakable evidence is present that it has progressed to a considerable extent beyond the primary location. Von Bruns found that the disease may be expected to have involved the testicle in 24 per cent. of the cases if it has existed for three months; in 40 per cent. after six months have elapsed; and in 60 per cent. if the disease has existed for more than six months. The duration of the disease is, as a rule, no indication to the extensiveness of the involvement of the seminal vesicle, the bladder, or the opposite organ. The presence of tubercle bacilli in the urine, and the existence of symptoms and findings strongly suggesting tuberculous involvement of the seminal vesicle and bladder, do not in themselves contraindicate unilateral castration. This operation should be done in these cases and many times the bladder and seminal vesicle will become normal when the primary diseased focus has been removed. It is probable that 50 per cent. of these moderately advanced, unilateral cases can be cured by epididymectomy, combined in suitable cases with removal of the testicle. In 26 per cent. of the cases studied by Von Bruns post-operative involvement of the opposite side occurred.

Bilateral operations for tuberculous disease of the testes are rarely indicated. Radical operations should be performed in bilateral cases only when the disease begins simultaneously on both sides. If the disease has had its starting point on one side, and has progressed to such a degree as to secondarily involve the opposite organ, then palliative operations are preferable to bilateral castration. It is, as a rule, impossible to cure these patients, and it seems that bilateral extirpation is not warranted under such circumstances. Many times, in these extensive and advanced involvements, partial excisions and incision and curettement of diseased foci will be all that is justifiable in attempting temporary relief.

CHRONIC HYDROCELE.

Chronic hydrocele is a surgical condition. Spontaneous recovery does not occur, except in instances of small hydroceles in children.

Operation is indicated in all of these cases in which the hydrocele inconveniences the patient.

The operation of choice should be aspiration, in patients whose general state will admit of only palliative measures: aspiration, followed by the injection of iodine and carbolic acid for patients who object to the cutting operation, or in cases where a cutting operation is inadvisable; and eversion or removal of the sac in patients who offer no objections to the radical operation.

The treatment of hydrocele by aspiration is palliative. Simple removal of the fluid cannot be depended upon to cure any case.

The injection of iodine or pure carbolic acid permanently relieves many of these cases. The method is inadvisable when the sac of the hydrocele is markedly thickened, and should never be resorted to if the hydrocele is reducible, or is complicated with a hernia.

Open operation is, perhaps, the most satisfactory method of dealing with a hydrocele if the sac is markedly diseased, or if tuberculosis is suspected complete enucleation is indicated. In other cases, eversion of the sac with closure of the wound will be sufficient. The suturing of the sac to the skin, followed by packing, should rarely, if ever, be practised. This procedure is not more efficient than other methods, and requires too long a time to accomplish the desired result.

VARICOCELE.

The presence of a varicocele is by no means an indication for operative treatment. In the great majority of instances a varicocele produces no symptoms. These cases present no indications for treatment. If a varicocele is associated with atrophy of the corresponding testis, the performance of a radical operation to relieve the varicocele may terminate the atrophy. In certain cases it is claimed that the radical operation for varicocele has resulted in not only a cessation of the atrophic process in the testis, but that the organ has regained its normal size as the direct result of the operative treatment. It is generally agreed, however, that the radical operation is justifiable if the symptoms of atrophy are progressing.

All cases of varicocele that produce local, reflex or general distressing symptoms should be subjected to operative treatment. These

symptoms not infrequently produce a serious and distressing effect upon the patient, and the radical operation for varicocele is such a safe procedure, is so easy to perform, is not associated with great loss of time, and is productive of such universally good results if done in properly selected cases, that we should advise it in all cases in which the condition produces unquestionable inconvenience.

Neurasthenic symptoms are very commonly present in patients who are suffering from varicocele. If the neurasthenia is a primary condition and does not depend upon the varicocele for its existence, then no operative treatment should be advised with the hope of relieving the nervous condition. If, on the other hand, it is plain that the neurasthenia is secondary to the varicocele, which is not uncommonly the case, operative treatment will give very satisfactory results, and should be advised by all means. Gastric and spinal symptoms that are not infrequently present in this class of patients may or may not be dependent upon the varicocele. If there is some doubt regarding the significance of the varicocele in producing these symptoms, the patient should receive the benefit of the doubt and should be advised to have his varicocele cured by an operation. If, on the other hand, these reflex, gastric or spinal symptoms can in no way be associated with the existence of the varicocele, no operative interference should be recommended.

Impotence alone does not present an indication for the operative treatment of a varicocele. It is true that many patients who have a varicocele are impotent, and it is probable that a varicocele in some instances is responsible for this distressing symptom. On the other hand we cannot say positively in any case that the impotence is or is not entirely dependent upon the varicocele, and cannot promise that a radical operation on the veins will entirely relieve the symptom. If there is reason to believe that a definite relationship exists between the varicocele and the impotence, a radical cure for the varicocele should be advised.

If it has been determined that a radical operation for the relief of a varicocele is indicated, there is one particular procedure that should be considered, viz., scrotal incision with ligation and resection of the dilated veins, followed by approximation of the cut ends, and complete closure of the skin wound. This procedure is not dangerous to perform and in the great majority of instances gives permanent and complete relief.

Suprapubic ligation and excision, commonly known as the "high operation" has many advocates.

Subcutaneous ligation of the enlarged veins, which was practised so extensively in the past, has been discarded for good reasons as a radical treatment for varicocele. Recurrences are too common for us to advise this operation. The procedure is also not without danger, but the strongest objection to it is that many recurrences have been known to follow its use. It should not be employed to-day with the idea of obtaining complete and permanent relief in any case of varicocele. It is true that many cases will be cured by this method, but it is too uncertain and its results too inconstant.

Operations on the scrotum, done with the idea of elevating the testicle, should not be performed for the relief of varicocele. They do not meet the pathological indications and in the great majority of instances give unsatisfactory results. Shortening of the scrotum, associated with the radical operation on the veins, has no advantages. The transverse suturing of the vertical scrotal incision, practised by Parker and others, has no particular merit.

MALIGNANT GROWTHS.

Malignant disease of the male genital organs calls for removal of the affected tissues and the regional lymphatic glands, when possible. The regional lymphatic glands should be dissected in all cases of malignant disease involving the scrotum. In dealing with malignant growths of the testicle the structures of the cord should be removed as high as possible. The vessels should be ligated high, while the vas should be ligated close to the bladder and its cut end cauterized. It is impracticable to remove the terminal lymphatic glands of the testicle. These are, according to Cuneo, situated around the aorta.

XVII. THE RECTUM.

HEMORRHOIDS.

Serious or long-existing cases of external or internal hemorrhoids call for operative treatment. It is true that relief may be obtained for some of the mild cases by non-operative attention. The results, however, from operative treatment are so satisfactory, and as a rule the relief is permanent, that operation should be the method of choice.

In operating upon the great majority of these cases general anesthesia should be resorted to and the clamp and cautery method carried out. Excision of the hemorrhoidal masses, or removal by the means of ligatures, will in most instances give equally good results. The opinion is offered, however, that the clamp and cautery method should be the one of choice in most instances.

Gradual dilatation of the rectum, followed by the injection of the hemorrhoids with a cocaine solution, or with hot water, and removal of the growths without general anesthesia can be practised with success in a large number of the ordinary cases. Gnat has given this method an extensive trial and is a strong advocate of its application. This operation should be advised for all selected cases in which there is reason to believe, from the general condition of the patient and from the location and extensiveness of the hemorrhoids, that a permanent result can be obtained by this method.

The operation advised by Whitehead, and later modified by Pratt and others, is unnecessary and many times unjustifiable. If a complete prolapsus is present the condition should not be classed as hemorrhoids, then demanding different methods of treatment. The unsatisfactory results that too often follow complete removal of the mucous membrane of the rectum present a positive contraindication for this operation in nearly all cases. The procedure is too serious to be considered for ordinary cases, while the results obtained by the methods advised in the foregoing are entirely sufficient if the operation is properly done. Other operative methods of treatment that have been used quite extensively in the past do not offer advantages sufficiently obvious to warrant us in resorting to them to-day. For this reason they will not be discussed here.

The treatment of hemorrhoids by injecting the masses with carbolic acid, or other caustics, should not be practised. Such methods produce as much discomfort to the patient as does the radical treatment, the benefits are not so certain, and, most important of all, serious complications occasionally follow. For these reasons chiefly that treatment has been discarded by the great majority of conservative and thorough operators.

FISTULA IN ANO.

In discussing the indications for operative treatment in fistulæ in ano we need consider only two varieties, the tuberculous and the non-tuberculous. Complicated fistulæ, communicating with the lower portion of the large intestine, are of uncommon occurrence; they are with difficulty classified, and, as a rule, the treatment of every case is different, both from the standpoint of indications and from operative technique, than that of any other of these complicated and extensive cases.

TUBERCULOUS FISTULÆ IN ANO.

It is difficult, if not impossible, at this time to state definitely the demands for operative treatment in cases of tuberculous fistulæ. The statements of many men with a large operative experience are not only not convincing, but many times misleading in regard to the nature and seriousness of the tuberculous anal fistula. Many of them convey the idea that these cases all afford positive indications for operative treatment, and that we are justified in subjecting all of these patients to operation. However, careful study of the reports of men who have given the subject thorough study, is sufficient to convince one that these statements are difficult, if not impossible, to accept; and that they are indefinite from the standpoint of theory and dangerous to practice.

In discussing the indications for surgical treatment for tuberculous fistulæ in ano, I shall divide these cases into three classes:

1. Simple tuberculous fistulæ with no signs or symptoms indicating the presence of tuberculosis in other portions of the body.
2. Extensive tuberculous fistulæ, with local and general findings that do not present positive indications of a tuberculous infection of other tissues.
3. Tuberculous fistulæ, with signs and symptoms clearly indi-

cating the presence of a latent or active tuberculosis in other parts of the body.

The opinion is held that a simple tuberculous fistula in ano, that is not of long standing and that is not associated with tuberculous changes in other parts of the body, can in the great majority of instances be completely excised with advantage to the patient, and satisfactory and permanent results obtained in at least some of these cases. On account of the difficulty of recognizing latent tuberculosis in the lungs, peritoneum or lymphatic tissues, and on account of the startling and rapidly fatal issues that have followed operations in these simple types, it is impossible to say that all of these cases should be subjected to operative treatment, and it is difficult or impossible to differentiate between the cases that can be successfully operated upon and those in which operative treatment will be followed by serious and comparatively rapid ill consequences. If there is any reason to believe that a latent tuberculosis exists, then it seems best to hold that radical excision of the fistula should not be tried. If the fistula is not extensive, incisions done with a cautery, for the purpose of establishing efficient drainage, followed by cauterization of the lining of the fistula, will be entirely sufficient to give the patient relief from the distressing symptoms, and sometimes will be as efficient in producing a permanent cure as will extensive cutting and suturing operations. These simple tuberculous fistulae should never be subjected to curetting and should never be incised with any instrument except the cautery. If there is reason to believe that complete excision and suturing is not indicated, the cautery should be the only instrument used in doing palliative operation. Although it is probably true that some of these cases have been cured by curetting, and that some of them have been relieved by incision with the knife, or with a ligature, the serious sequelae that have been shown to follow such simple operative procedures are sufficiently serious to warrant us in refusing these measures in all cases.

It is believed that extensive tuberculous fistulae occurring in patients that show no evidence of tuberculosis in other parts of the body should rarely be subjected to the operation of excision and closure of the wound. If there is reason to hope, from the extent of the disease and from its duration, that it can be entirely removed the operation of excision might be attempted. Experience has shown, however, that if these cases are of long-standing, that if the fistula

has many openings, or extends for a considerable distance along the course of the bowel, a complete and permanent eradication of the disease can rarely be expected to follow the most thorough excision. These fistulous tracts should be opened freely with a cautery, and the lining of the fistula should be cauterized as thoroughly as possible with the actual cautery. The efficient drainage will in the great majority of instances relieve the pain, while the cauterization of the lining of the fistula has been followed by as good remote results as complete excision. These fistulæ should never be curetted, neither should incisions with the knife be made into them. The danger of such procedures is the immediate or remote development of a tuberculosis of the lungs or of the peritoneum, that, in the majority, proves fatal. It is generally accepted, for good reasons, that incision and cauterization with the actual cautery do not afford this danger of the occurrence of serious complications.

Tuberculous fistulæ, with signs and symptoms clearly indicating the presence of a latent or active tuberculosis in other portions of the body, should not be subjected to radical operative treatment. Little good can be done by subjecting any of these cases to radical excision. We are justified in these cases in securing efficient drainage by the use of incisions with the cautery, and many times some good can be done by cauterizing the lining of the fistula, but more extensive procedures will not be followed by sufficiently good immediate or remote results to warrant their practice. Occasionally excision can be made in these patients and there will seem to be improvement for a time; that is, the wound will heal completely and the general condition of the patient will not be materially affected.

The use of the ligature in the treatment of tuberculous fistulæ should be condemned. It possesses all of the disadvantages of the knife, while it has none of the advantages of the cutting method. The same may be said for the treatment of tuberculous fistulæ by the use of chemicals. Although it is possible that chemical treatment may be productive of a good result, I am of the opinion that such cases are extremely rare.

The treatment of tuberculosis in an anal fistula should therefore be operative to the extent that drainage be secured and cauterization done. Complete excision of the fistula may be applied in a few instances, but should never be advised if there exists tuberculosis in other portions of the body, or if there is reason to believe that the

entire fistulous tract cannot be removed. For all other cases of tuberculous fistula in ano, incision with the cautery for drainage, and cauterization of the fistulous tract with the actual cautery, are the only methods that can be safely practised.

It will be seen from the foregoing that tuberculous fistula in ano is considered a serious and important condition. It is possible that one may overestimate the importance of this disease, and it is also possible to be too conservative in advising radical operative treatment. On the other hand when we consider that fourteen per cent., according to Allingham, of all fistulæ are tuberculous, that many of these cases have tuberculosis in other portions of the body, that recurrences following extensive operations are very common, and that the development of a serious tuberculosis in other portions of the body not infrequently follows operations on these cases, there is good and sufficient reason for us to regard these cases seriously and not to advise operative treatment without careful study of all the conditions, and without a careful consideration of the immediate and remote effects. It is true that many operators of large experience do not look upon a tuberculous fistula in ano as a serious affair; they unhesitatingly state that it presents a positive indication for surgical treatment, and they seem to have no fear in subjecting these patients to incision, curettings, and even partial excision. I am of the opinion that the successful treatment of a tuberculous fistula in ano requires profound judgment and a keen appreciation of the nature and seriousness of the condition and its post-operative sequelæ.

NON-TUBERCULOUS FISTULÆ.

A non-tuberculous fistula in ano offers, in all cases, a certain indication for operative intervention. Although it is possible that some of these cases may result in cure spontaneously, or that local treatment will be efficient occasionally, the great majority of them must be subjected to operation before satisfactory and permanent relief can be obtained.

If the fistula is small and is strictly subcutaneous, incision under a local anesthetic, followed by packing and medication of the fistulous tract, will be entirely sufficient. If, on the other hand, the fistula is very extensive and involves more important structures, or communicates with the rectum, general anesthesia must be resorted to and a radical operation performed. Excision should be done in all of these

cases if there is reason to believe that complete removal of the diseased tract can be accomplished. If the tract can be satisfactorily removed, primary suturing of the wound should follow. If there is reason to believe, from the chronicity of the infection and from its extensive involvement, that complete excision cannot be accomplished, the operation should provide efficient drainage for all the diseased area. The incisions should be extensive enough to open every focus of infection and to allow for thorough drainage for the entire fistula. Curetting and local medication will be advantageous in most of these cases, but the efficient drainage is the most important consideration for obtaining a permanent result. It is not necessary that the cautery should replace the knife in operations for non-tuberculous fistulæ.

STRICTURE OF THE RECTUM.

A rectal stricture is a progressive condition. It invariably becomes more serious in character, produces increasingly distressing symptoms, and, if untreated, will certainly terminate the life of the patient either by direct effects or by complications dependent upon the presence of the stricture. For these reasons a stricture of the rectum calls for early local or operative treatment.

A classification of rectal strictures is of little importance from the standpoint of indications for treatment. Congenital strictures, malignant strictures, and strictures due to perirectal disease, are well understood and have been pointed out elsewhere. All other strictures may be considered inflammatory in character; and the indications for treatment, discussed in the following, applies only to progressive and inflammatory rectal constrictions. Syphilitic stricture of the rectum is, in the great majority of examples, no exception to the rule regarding the demands for mechanical treatment. Internal medication is of little value in dealing with syphilitic rectal stricture. All of the operative and non-operative methods advised and practised for the relief of stricture of the rectum are open to objections. None of them is free from danger, and all of them frequently fail to meet the requirements in certain instances.

Gradual dilatation of a rectal stricture, practised extensively at the present and in the past, should be advised in most strictures of a moderate degree, and is the method of choice in rectal strictures that are non-resistant and yield readily to this form of treatment. The method is by no means free from danger, especially in cases asso-

ciated with extensive ulceration. It rarely succeeds in permanently curing the patient, and it must be repeated more or less frequently during the patient's life. Notwithstanding these objections, the method should be resorted to in all cases in which the stricture yields readily to gradual dilatation.

Cases of stricture of the rectum that cannot be treated by gradual stretching, or that refuse to yield to this method, are perhaps best treated by excision. Excision of rectal strictures is an operation that is attended by considerable immediate and remote danger, and does not completely cure the patient in all cases. Recurrences following resection are by no means uncommon; and serious and sometimes permanent complications follow this operation. It is, however, perhaps the best method that we have to-day of dealing with strictures of the rectum that cannot be treated successfully by gradual dilatation.

Proctotomy, either internal or complete, is, on the whole an unsatisfactory method of dealing with rectal strictures. An internal proctotomy, though not without danger, may be indicated in a few carefully selected cases of annular rectal stricture. Complete proctotomy is probably a less desirable procedure than rectal excision, for the reason that it is dangerous to perform, and rarely cures the patient. Kelsey, Cripps, Allingham, Ball, and others speak favorably of complete proctotomy for rectal stricture. It is probable that these men have over-estimated the efficiency of this operation. The reports of Lachowski, which show only one successful result following thirty-two complete proctotomies, doubtless give quite clearly the true status of this procedure.

Palliative operations are occasionally indicated in advanced cases of rectal stricture. An inguinal colostomy may be necessary to relieve an advanced case, or this operation may be advisable to prepare a patient for rectal excision. This is especially true if the stricture is associated with marked inflammatory and ulcerative changes.

Unusual operations, as intestinal anastomosis, or proctoplasty, may occasionally be demanded to relieve rectal stricture. When these operations are indicated the conditions in the case are exceptions to the rule. The application of these operations and their efficiency depend entirely upon the unusual form of stricture that is present, and the location of the same. As a rule, entero-anastomosis and proctoplasty are rarely required in dealing with stricture of the rectum.

PROLAPSE OF THE RECTUM.

The indications for surgical treatment in prolapse of the rectum depend upon the variety and degree of the conditions, the cause of the prolapse, and, many times, on the general state of the patient.

Prolapse of the mucous membrane of the rectum, unassociated with descent of the other coats of the bowel, requires operative treatment only in a moderate percentage of the cases. If the condition is not marked, occurs in young or in old patients whose general health is much below par, or if the rectal prolapse occurs only at intervals, operative treatment will rarely be required. If the prolapse of the rectal mucous membrane is dependent upon, or associated with, hemorrhoids, polypi, or local inflammatory processes, the operative treatment indicated to relieve these complications will be sufficient to cure the patient. If a prolapse of the rectal mucous membrane is extensive, and tends to recur after it has been kept replaced for a considerable period of time, operative treatment is indicated.

In moderate degrees of prolapse removal of portions of the mucous membrane, followed by cauterization, will suffice to prevent a recurrence of the displacement. This operation corresponds to the ordinary clamp and cautery method of treating piles. If the prolapse is extensive a resection of the mucous membrane is indicated. A resection is also indicated if the prolapse is dependent upon a well-defined stricture that refuses to yield to palliative treatment. The operation of resecting the mucous membrane of the rectum for the relief of prolapses is identical with Whitehead's operation recommended for certain cases of hemorrhoids. In doing this the incision should be placed within the anal margin. This procedure is by no means without danger, but is perfectly justifiable in properly selected cases.

Among the operations that have been devised and practised to cure prolapse of the rectum especial mention may be made of the injection of paraffin. This method has been highly praised by some who have given it a trial. A submucous injection of paraffin is made into perhaps three different places of the prolapsed portion of the bowel. Burgess has used it successfully in treating eighteen cases.

Prolapse of all the coats of the rectum more often requires operative treatment than prolapse of the mucous membrane alone. If prolapse of the entire intestinal wall is of a marked degree, or frequently recurs, operative treatment is necessary.

Many operations have been suggested and practised for the relief of this displacement. While most of these have a limited field of usefulness, there are, perhaps, two that can be recommended to relieve complete prolapse of the rectum.

If a prolapse of the rectum is associated with a stricture, resection of the prolapsed area should be the operation of choice. This can be done by the perineal method, and while serious to perform, usually produces satisfactory results. In doing this operation the presence of a rectal hernia must be kept in mind, and injury to the small intestines must be guarded against.

If the lumen of the rectum is not markedly narrowed by a stricture, sigmoidopexy should be the operation of choice. In treating rectal prolapses involving all the coats of the bowel, the sigmoid should be sutured to the transversalis fascia, and not to the peritoneum. If the operation is carried out in this manner a recurrence of the prolapse can rarely be expected. In some of these cases it is advisable and desirable to obliterate perirectal, peritoneal pouches by suturing. This procedure doubtless assists in preventing a recurrence of the prolapse.

CARCINOMA OF THE RECTUM.

Carcinoma of the rectum, like malignant growths in other parts of the body, can be treated successfully only by radical removal. The indications for operation, like in other carcinomas, depend entirely upon the early recognition of the disease. Early diagnosis of carcinoma of the rectum positively calls for rectal excision unless the general condition of the patient contraindicates the performance of any operation. There is no question regarding the advisability of radical operations in these early cases, and the operation, of course, will be a perineal removal, removal by way of the sacral route, or an abdominal or a combined operation, depending, of course, on the location of the growth.

We are not justified in operating upon advanced malignant diseases of the rectum. If general metastatic growths are present, if the liver is concerned, if extensive local involvements can be determined, or if the general condition of the patient is serious, no radical operation is justifiable.

The difference of opinion that exists to-day regarding the indications for operation for carcinoma of the rectum is limited to the so-

XVIII. THE FEMALE REPRODUCTIVE ORGANS.

The acute inflammatory diseases that are so frequently met with in the pelvic organs of women many times require operative treatment. While it is true that the great majority of these cases will become subacute or chronic if not operated upon, occasionally a surgical operation will be necessary to relieve an acute inflammatory disease of these parts. The operation in these cases should consist, in the great majority of instances, of simple drainage. As a rule, we should never remove inflammatory tissue in acute conditions. If dead tissue is present, either within the uterine cavity or in other portions of the pelvis, it should be removed only to limit infection. If no dead tissue is present drainage, and not the excision of diseased or inflammatory tissue, should be the operation in all of these acute conditions. The advantage of resorting to this method of treatment is that the efforts of nature to limit the spread of infection are not interfered with when a drainage operation is performed, and that infectious material is not disseminated by this simple operative procedure. It is true that if drainage is all that is done in operating upon acute diseases of the female pelvis, a secondary operation may occasionally be required. These secondary operations are comparatively safe, and for this reason more than one operation does not contraindicate the universal application of drainage when an operation is indicated for acute inflammatory pelvic diseases.

Acute infections that follow abortion or labor are perhaps best treated by prophylactic measures. The prevention of infection during normal delivery has been fully discussed and will not be considered at this time. It may be impossible to prevent infection in certain cases of premature delivery or abortion. The indication for treatment will then depend upon the occurrence of hemorrhage, or symptoms indicating infection. If the fetus has or has not been expelled nothing should be done unless the hemorrhage is severe. If symptoms of infection are present operative treatment is indicated at once. If treatment is indicated in these cases the entire uterine cavity should be thoroughly emptied; otherwise, the expectant plan should be the method of choice.

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The treatment of infections following delivery or abortions depends entirely upon the degree of such infection, the location of the inflammatory process, and the resistance of the patient. In cases of septicemia there is always an indication for operative treatment. In these cases the uterus should be emptied without delay; sharp instruments should not be used; prolonged irrigation with antiseptics is unnecessary. It may be impossible to tell in some, from the symptoms or from the history of the case, that the patient is suffering from septicemia alone, or that the infectious process has extended beyond the uterus. The existence of a profuse, foul-smelling discharge is an indication for exploring the cavity of the womb in all of these patients. If a patient shows local and general evidences of infection, and is suffering from paroxysmal uterine pains, it is reasonable to expect that foreign material will be found within the uterus. An exploration of the uterine cavity is then indicated. The removal of septic material from the uterine cavity will be entirely sufficient in all cases of septicemia. Of course if a septic patient is at the same time suffering from pelvic infection, the indication for emptying the uterus cannot be overlooked, while the pelvic infection may demand further operative treatment. Combinations of infection are common in the puerperal state.

In cases of general acute septicemia following labor or abortion, no operative treatment is indicated. These patients give marked general evidences of infection and complain little or none of local symptoms. Physical examination is negative. These acute and rapidly fatal cases, that do not complain of pain or tenderness and show no evidences of inflammatory collections in the pelvis when examination is made, should never be treated by operation. Drainage or removal of diseased tissue can do no good. The infection has already passed into the general circulation, and no operative measure is demanded.

Occasionally a thrombo-phlebitis may be the most important pathological factor in producing symptoms of infection following labor or abortion. It is probable that an operation, as a rule, will not be indicated to relieve these cases. If the infection is associated with a pelvic peritonitis, or with a cellulitis, operation may be necessary to relieve the combined condition, but as a rule it will be impossible in most cases to determine positively that the thrombosed veins are responsible for the prolonged septic symptoms, and it would be unwise to say that the removal of these veins would give sufficient

relief to advise the performance of the operation. Freund, Brunn, Trendelenburg and Zweifel have operated successfully on some of these patients, removing the ovarian and hypogastric veins.

Serious septic infection, limited to the uterine walls, is an uncommon condition. Operative procedures performed with the idea of relieving infection in the uterine musculature are rarely if ever indicated. The acute cases usually subside if drainage is provided for through the cervical canal. Of course if it is possible to diagnose the presence of multiple collections of pus in the uterine muscles, operative measures would be required to afford drainage. The opinion is given that the removal of the uterus, which has been practised quite extensively in the past, or multiple perforations into or through the uterine wall, are rarely, if ever, justifiable in dealing with any case of pelvic infection. The curetting with sharp instruments of an acutely infected uterus should be condemned. Little is to be gained, also, by tamponing the uterus or by applying strong chemicals to the endometrium.

PELVIC PERITONITIS.

Pelvic peritonitis is the most common form of serious infection that follows labor or abortion. These cases are easily recognized, both on account of the symptoms and the physical findings. The pain is intense, abdominal distension and tenderness the rule, and intestinal paresis common. Examination shows extreme tenderness of the pelvis, with more or less induration and tenderness in the cul-de-sac, and not infrequently the presence of enlargement in the region of the appendages. The majority of these less severe cases should be treated by non-operative measures. Absolute rest usually results in the limitation of this process by nature and complete resolution not infrequently follows severe degrees of pelvic peritonitis if the progress of the disease is not interfered with. If there is reason to believe, from the seriousness of the symptoms and the physical findings, that collections of pus are present, or that nature will not limit the infective process, operative measures should be considered. Operations upon the uterus or curettement of the organ can do no good in relieving these conditions. An abdominal section should never be performed in these acute, progressing cases. If there is reason to believe that the patient cannot overcome the severity of the infection a retro-uterine incision, followed by exploration of the pelvis and efficient drainage, should be

done without delay. This procedure is not dangerous to perform, it is quickly accomplished and affords efficient drainage in the most dependent part of the pelvic region.

Secondary operations following posterior uterine drainage are seldom performed when the primary operation has been done to relieve pelvic peritonitis. If a pelvic peritonitis results in abscesses, drainage is indicated. In the majority of these cases, the abscess cavity can be most easily reached by a posterior uterine incision. Occasionally these abscesses will point in the groin above Poupart's ligament. An abdominal incision is indicated in treating these cases. It is unwise in doing any of these operations for acute conditions to remove inflammatory tissue. If the abscess cavity is outside, or does not communicate with the lining of the Fallopian tube, it is unnecessary to remove inflammatory or diseased tissue. If the abscess is within the tube, a secondary operation may occasionally be required, but on account of the dangers of primary toxemia in extensive operations in these acute infective diseases no inflammatory tissue should be removed at the time the primary operation is done.

PYOSALPINX.

Pus tubes occur uncommonly in puerperal infections. A simple pus tube, unassociated with peritoneal inflammations, should never be operated upon during the acute stages. If the inflammatory process is limited to the tube the disease will become subacute or chronic if left alone. On the other hand if a pus tube involves the peritoneal structures and results in adhesions to surrounding parts, or any abscess outside of the tubes, the treatment should be the same as that advised for pelvic peritonitis. Operative treatment should be avoided in the acute stage if possible; otherwise drainage is all that is justifiable. The drainage in these cases should rarely be through an abdominal incision. The pelvic method drains efficiently and is a safe procedure when compared with abdominal section in acute suppurative diseases of the tubes.

PELVIC CELLULITIS.

Pelvic cellulitis is to those who have not met the condition or who have not observed its peculiarities, both clinically and pathologically a puzzling condition indeed. For this reason and on account of the neglect of many authorities to discuss the subject fully we may briefly

mention some of the characteristic clinical and pathological facts that mark it as a distinct disease.

These patients complain of early and severe general symptoms of infection. Chills are frequent and are prolonged and the temperature and pulse rate are high. Depression may be profound or the patient may have a fairly good appearance. The characteristic clinical feature of this disease is the marked general symptoms of infection with complete absence of local symptoms or findings. Pelvic cellulitis is a painless disease and tenderness is rare, especially in the early stages of the infection. Examination during the first week usually reveals no change in the pelvis. No tenderness is found, no infiltration present and no localized thickening can be determined. After the first week an induration exists. Usually this occurs first on the side of the uterus, is hard, fixes the pelvic organs, and is slightly tender. The induration usually progresses. One side of the pelvis is first involved, then the process extends to the other side, fixes firmly all the pelvic structures, many times encircles the rectum and occasionally extends into the abdominal area so that it can be palpated in the groins. This condition remains usually from seven to nine weeks when resolution occurs spontaneously in most cases. The chills become less severe, the temperature variations less marked and the induration begins to disappear. Most of these cases recover permanently and completely. Marked displacements following pelvic cellulitis are uncommon indeed. Operation is not indicated for these cases unless localized suppuration occurs. This is an exception and not the rule. If there is cause to believe, on account of the presence of a localized fluctuating area in the indurated inflamed pelvic tissue, that an abscess may be suspected drainage of course is indicated. These abscesses usually occur from seven to nine weeks after the beginning of the infection. They most often point above Poupart's ligament but occasionally may point in the pelvis. Incision and drainage is all that is indicated if a local collection of pus is found during the course of a pelvic cellulitis.

Complete hysterectomy for the relief of any form of puerperal infection is probably an unjustifiable operation. Of course if a sloughing fibroid was present, or some other condition that demanded an independent hysterectomy, removal of the womb should be considered. In all other cases the infection is treated perhaps best without removing the uterus. Of course, some of these patients will die,

but according to Fehling, Treub and Leypold the mortality is increased rather than diminished by performing hysterectomy. I am of the opinion that in the future complete hysterectomy will rarely if ever be performed to relieve the serious infections that follow labor or abortion.

ACUTE GONORRHEAL INFECTIONS.

Operative treatment is rarely necessary in acute gonorrheal diseases of the pelvic organs. If these processes result in abscess formation, or in severe, progressing, pelvic peritonitis, and if the patient does not seem sufficiently strong to limit the extension of the inflammatory process, retro-uterine pelvic drainage is indicated.

Acute gonorrheal endometritis never presents an indication for operative treatment. Curettement of the uterus in these cases rarely benefits the patient and many times is the direct cause of extra-uterine complications.

Acute gonorrheal salpingitis is a common condition. In a large number of these cases the infective process does not extend beyond the Fallopian tubes. If suppuration occurs, but the process remains within the Fallopian tubes, no operation should be done in the acute stages. Gonorrheal pus tubes unassociated with marked involvement of the surrounding pelvic structures, become subacute or chronic. Operation in these acute cases is only indicated when nature seems unable to limit the spreading of the disease; when large collections of pus are present in the pelvis; or when the infection is a progressive and virulent one and defies all non-operative measures. If these conditions are present drainage is indicated. The operation then should be done, as a rule, through the vagina. A laparotomy should never be resorted to for the relief of acute, suppurative conditions in the pelvis, unless the location of the suppuration is an exceptional one, with the abscess most prominent in the hypogastrium.

In doing these operations adhesions should not be separated and diseased tissue should rarely be removed. Drainage is all that is required in these acute cases. Although the primary operation must be considered as a palliative measure, it not infrequently is followed by permanent relief to the patient. It often happens, however, that it is necessary to perform secondary operations on these patients to destroy adhesions, to correct displacements, or to remove diseased tissues.

SUBACUTE AND CHRONIC INFLAMMATIONS INVOLVING THE TUBES AND OVARIES.

Subacute or chronic inflammatory conditions involving the tubes or ovaries mostly result from acute infections. As a rule they produce more or less definite and characteristic, intermittent or continuous, symptoms. These conditions afford indications for operative treatment, provided that the general health of the patient does not determine against the performance of a surgical operation.

The operation in these cases should be removal of the markedly disorganized tissue, the releasing of organs interfered with by adhesions, and the treatment of other complications that are not infrequently met with in patients suffering from subacute or chronic inflammations resulting from primary acute salpingitis. Conservative operations on affected ovaries are many times indicated in this class of patients. Healthy portions of ovaries should not be removed in operations for simple inflammatory conditions. This statement does not hold good in dealing with tuberculous processes. If a portion of an ovary is involved in a tuberculous process the entire ovary should be removed.

These operations done for the relief of subacute and chronic inflammatory disease in the uterine adnexa have a very low mortality, and give very satisfactory results.

CYSTIC AND SOLID GROWTHS IN THE UTERINE ADNEXA.

Benign and malignant neoplasms as a rule offer indications for removal as soon as they are recognized. The indications for treatment in these cases have been fully discussed and are well understood. For this reason these growths will not be discussed at this time.

ADHESIONS.

The presence of marked pelvic adhesions, associated with symptoms pointing unmistakably to pelvic disease are in themselves a sufficient indication for an operation. As a rule these patients give a definite history of having suffered from acute infections, and the adhesions are generally associated with complications that demand surgical treatment. If the case seems one of uncomplicated adhesions, palliative measures may give relief. Although prolonged non-operative treatment may cure some of these patients, operation will usually be advisable if the pelvic organs are markedly fixed and the symptoms severe and of long standing.

The procedure in these cases should be laparotomy; and the conditions observed after the abdomen has been opened will indicate the operation that should be carried out.

UTERINE DISPLACEMENTS.

It is difficult and perhaps inadvisable to attempt to state positive reasons for operative treatment in cases of uterine displacement. A simple uterine displacement of any variety rarely occurs unassociated with other pathologic conditions. It is true that it not infrequently happens that a displacement of the uterus is a primary factor in the pelvic changes that produce symptoms sufficiently severe to warrant operation; and it is true that many times a displacement of the uterus is the most marked change that is found on examination of these patients. Nevertheless, as a rule, the displacement itself is of secondary importance in the immediate causation of symptoms. For this reason the correction of the displacement does not meet the pathologic indication. On account of the fact that the majority of chronic, gynecological diseases are due to a complication of pathologic conditions; on account of the fact that, too often, operators overlook lesions of importance in treating these cases surgically; and for the reason that the nervous element in these cases has been, in a measure, neglected by many, therefore a difference of opinion exists regarding the relation of displacements and chronic inflammatory conditions to symptoms, the advisability of performing operations upon these patients, and the extent of the operative interference that is indicated.

In considering these common and sometimes distressing conditions it must be remembered that some uterine displacements do not, in themselves, produce symptoms; that others as a rule are responsible for more or less definite symptoms; that in a large number of these patients secondary, progressive complications ensue; that the nervous element is a factor of prime consideration in all; that complicated pathologic conditions are most often met with; and that the operative treatment is productive of very satisfactory results if the pathologic indications are fully met.

Before it has been decided upon to operate for the relief of chronic displacements or inflammatory conditions in the pelvis, the nervous system of the patient must be given careful attention. It is generally admitted that lesions in the female genitalia are likely to be associated with marked functional, nervous changes. It must not be

forgotten that a pelvic disease, apparently insignificant, will occasionally be responsible for distressing nervous symptoms. On the other hand we should never lose sight of the fact that, in women, neurasthenia or closely allied conditions are commonly met with; that many times these nervous diseases are primary in character; and that these patients are prone to attribute their nervous symptoms to pelvic disease. It must also be remembered that a patient suffering from a primary and independent nervous affection may have, at the same time, a chronic displacement or inflammatory condition in the pelvis that is not responsible in any way for the symptoms complained of.

In order to treat chronic pelvic disease successfully one should bear in mind that a primary neurasthenia is not amenable to operative treatment; that certain pelvic pathologic conditions produce few or no symptoms; and that a definite relationship between the pathologic conditions and the symptoms complained of must be established before operative treatment is permissible. If it has been decided to subject the patient to operative treatment, not only the most important pathologic conditions must be remedied, but all of the complicating abnormal changes that are found in the pelvic organs must be looked after, if the best results are to be expected.

CYSTOCELE.

A cystocele must be looked upon as a hernia of the bladder. It may or may not produce symptoms sufficiently urgent to require operative treatment. A cystocele is, in almost every instance, complicated with other and many times more significant pathologic changes; and if an operation is done to relieve this condition, it is probable that other surgical procedures than that for the repair of the cystocele are necessary. All operations for the relief of cystocele must provide against uterine-vesical pressure, and must be associated with an operation on the anterior vaginal wall that extends through the vagina to the bladder. Removal of the vaginal mucosa with approximation is insufficient to benefit a cystocele. If a portion of the anterior vaginal mucosa is removed the anterior vaginal wall should be included in the excised tissues.

RECTOCELE.

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indications for such treatment but, like a cystocele, a rectocele is usually associated with other abnormalities that demand surgical care.

OVARIAN PROLAPSE.

It is generally admitted that a prolapsed ovary can and does produce distressing and definite symptoms. These patients complain of pain and many times marked nervous symptoms. The prolapsed organ is easily recognized, and while it is very tender to pressure is not necessarily enlarged. These cases present clear indications for surgical treatment. If the condition has been of long standing the prolapsed ovary is likely to be markedly degenerated, and for this reason calls for removal. If the organ is in fairly good condition it should be held in proper position by suturing or by being placed through an incision in the broad ligament, bringing it anterior to the ligament. Operation in these cases produces very satisfactory results. Care should be taken, however, in operating upon these patients that associated or complicated abnormalities are not neglected.

MARKED UTERINE PROLAPSE.

Marked prolapsus of the uterus is a definite requirement for operative treatment in almost every instance. These conditions are usually associated with other changes that also require treatment. In the majority of instances plastic vaginal operations, associated with amputation of the cervix and suspension of the uterus, will give satisfactory results. The operation on the anterior vaginal wall should consist of a resection of a portion, and the removal of crescentic portions of vaginal tissue on each side of the uterus, extending from the vaginal fornix anteriorly. These operative procedures force the cervix into the posterior part of the pelvis; and, if associated with uterine support from above, produce satisfactory results in all but exceptional cases of uterine prolapse.

Vaginal hysterectomy to relieve uterine prolapse should not be recommended. The remaining genital tissues many times continue in their descent after the uterus has been removed. It is difficult, or impossible, in some cases to prevent vaginal prolapse after the uterus has been removed.

MODERATE DEGREES OF UTERINE PROLAPSE.

A moderate prolapse may or may not produce symptoms sufficiently severe to require operative treatment. Owing to the fact that

a prolapse gradually becomes more marked, operation should be advised if the condition seems progressing and causes moderately severe symptoms. The operative treatment in these cases is best carried out by plastic operations on the vagina and cervix, associated with a laparotomy if inflammatory or other surgical conditions are present in the adnexa. A suspension, or fixation, or operation on the broad ligament is advisable in these cases, especially if a pregnancy is not likely to occur.

RETRO-DISPLACEMENTS OF THE ENTIRE UTERUS.

A retro-displacement of the uterus without prolapse, or version, occasionally occurs, and not infrequently is responsible for symptoms that are sufficiently distressing to warrant operative treatment. The operation in these cases should consist of plastic measures on the broad ligament or uterine ventro-fixation.

SIMPLE VERSIONS AND FLEXIONS.

These conditions rarely produce symptoms severe enough to require operation. A simple uncomplicated retroversion or flexion rarely cause symptoms. Theilhaber, Winters, Winternitz, Schultz, Winckle and others make positive statements that these uncomplicated versions and flexions are not responsible for symptoms. While this is true, the fact must not be lost sight of that many of these simple displacements are associated with apparently insignificant changes in the adnexa, and that the combination of pelvic changes is many times responsible for symptoms that are amenable to operative treatment. If a patient with an apparently uncomplicated retro-displacement of the uterus, complains of marked and continuous pelvic symptoms, and is not suffering from a primary, functional nervous disease, it is probable that the symptoms can be relieved by operative measures; and for this reason surgery should be advised. The operation that is required should deal especially with the adnexa, and should, at the same time, provide for retaining the uterus in approximately its normal position.

CURETTEMENT.

Curettement for chronic displacements or inflammatory conditions of the uterus should rarely, if ever, be performed unless it is associated with other operative procedures. The opinion seems warranted that a chronic endometritis rarely exists unless it is dependent upon, or associated with, other conditions that cannot be cured by

curettage. Curettage of the uterus can be expected to produce only temporary relief if an endometritis is dependent upon malpositions of the uterus or diseases of the adnexa.

AMPUTATION OF THE CERVIX.

Amputation of the cervix is indicated in marked hypertrophy or elongation of this portion of the womb; for long-standing and marked inflammation of the cervix; or when the cervical tissue is markedly disorganized and cicatrized, resulting from old lacerations and inflammations. As a rule other operative procedures are required to give a patient relief, if it is found advisable to amputate the cervix.

LAPAROTOMY.

A laparotomy is usually indicated in dealing with chronic pelvic diseases. In almost all of these patients changes sufficiently marked to require surgical treatment may be found in the tubes, ovaries or appendix; and these conditions must receive attention if the best results are to be obtained. The advisability of attaching the uterus to the parietal peritoneum of the abdominal wall, or fixing it to the abdominal muscles, will depend upon the degree of uterine displacement and the probable efficiency of plastic vaginal operations. These operations that support the uterus from above are essential to produce good results in many cases. The chief objection to them is the occurrence of pregnancy. Operations on the round ligaments do not seriously interfere with pregnancy, but are seldom if ever indicated. They meet the indication only in cases of uncomplicated retroversion, and these patients seldom, if ever, require operative treatment. Operations on the round ligaments cannot be expected to do good in cases of prolapsus of the uterus.

PANHISTEROKOLPECTOMY.

This operation, which consists of removal of the uterus, adnexæ, and entire vagina, followed by obliteration of the vaginal canal, is indicated in a few marked cases of uterine and vaginal prolapse that produce distressing symptoms, and that recur after other operative measures have been given a trial. The operation gives good results, but its objections are obvious. It should be undertaken only in exceptional cases, and after it has been deliberately considered by the patient.

PREGNANCY.

The relation of pregnancy to surgical operations for uterine prolapse is an important one. Vaginal plastic operations do not interfere materially with delivery, but the effect of the operation is many times lost if a pregnancy follows its performance.

Ventro-fixation of the uterus should rarely, if ever, be done if a pregnancy is likely to occur. It is true that we have no good substitute for this operation and that many times it is indicated in women during the child-bearing period.

LACERATION OF THE CERVIX.

So much has been said regarding the indications for operating upon acute and long-standing lacerations of the cervix, and so many different opinions have been voiced by good men regarding the significance of these lesions and their relation to symptoms, that little can be gained by quoting the many positive statements that are too often made without proof. It is generally agreed that a tear of the cervix should not be immediately repaired, unless severe and uncontrollable hemorrhage occurs from the wound surface. When these tears occur the uterine tissue is not in the best condition to secure primary union, and approximation is hard to maintain if the operation is done at once. It is equally true that a laceration of the cervix should not be repaired years after it has occurred. If the condition is causing symptoms it is probable that the laceration is not responsible for the diseased conditions and that complications, either inflammatory conditions involving the cervix, or the endometrium of the body of the womb, or displacements, are responsible for them. Multiple tears of the cervix, or an extensive single tear, should be repaired, according to Hearst, about five days after delivery. Subinvolution will be prevented in some instances if this advice is followed. Old lacerations or recent lacerations rarely produce severe symptoms. Little can be expected by operations for these conditions unless the cicatrix is tender, or is ulcerated, or there is reason to believe that the tear is responsible for subinvolution, or for chronic inflammatory diseases.

Operations to repair a cervical laceration do good in many instances, but the great mistake in these cases and the diversity of opinion that seems to be so prevalent have resulted from operations for lacerations of the cervix in which the laceration produced no symptoms, but in which the complaints of the patient depended upon other

pathological conditions. An operation to repair a cervical laceration cannot be expected to cure a chronic inflammation of the womb, and can in no way be of marked benefit in cases of prolapse, marked flexions or versions. Cervical lacerations only occasionally are responsible for distressing symptoms, and when a patient comes for relief of a laceration of the womb in the majority of cases other pathological conditions are producing the symptoms.

LACERATIONS OF THE PERINEUM.

Immediate repair is called for in most lacerations of the perineum. Operation is indicated in all forms of complete laceration, or in extensive lacerations that do not produce symptoms. In cases of long-standing laceration of the perineum an operation may or may not be demanded according to the inconvenience to the patient. It is probable that in these chronic cases complications and other pathological entities are present and that, while the laceration of the perineum should be repaired, other operative procedures are likewise indicated. Repair of a laceration, in itself, cannot be expected to cure a prolapse of the uterus, or to materially benefit an endometritis, or to improve a cystocele. These operations do good in properly selected cases. They are not of value, however, with the sole idea of relieving marked nervous symptoms, nor is it believed that they materially benefit marked displacements, or inflammatory conditions in organs not directly associated in the pathologic process.

FIBROID OF THE UTERUS.

At the present time Noble, Eastmann, Wall and others who have studied these tumors closely, in reference to the indications for surgical treatment, are of the opinion that generally the presence of a fibroid tumor of the uterus is an indication for operation. Of course, there are exceptions to this rule, but a careful study of the results of operative treatment, and the complications and conditions that terminate the life of the patient when not subjected to surgical operation, point strongly to the latter treatment in all but a few of these cases. Only a few years ago such advice would have been considered extremely radical. Skene, Emmet and others in this country, and Keith, Schröder and Winckle abroad, expressed the opinion that uterine fibroids were self-limited diseases, that they rarely killed, and should not be placed under surgical treatment unless complications developed that threatened the immediate destruction of the patient.

The reasons for this marked change of opinion are many. New surgical technique, the careful recognition of the remote effects of fibroid tumors and the success of early operative treatment for these growths have convinced most members of the profession that a uterine fibroid is in all cases a surgical disease, that operative treatment, if properly carried out and not unduly delayed, is a safe and thorough method of dealing with these tumors and that the results of such treatment, compared with the results of palliative measures, clearly support us in advising surgery in the great proportion of these cases.

A consideration of the mortality of uterine fibroids when not treated surgically shows that thirty-three per cent. may be expected to die from the immediate effects of the tumor, or from complications developing in the pelvis or in distant portions of the body. It is probably true that the majority of these patients who do not die from the direct effects of the tumor succumb to diseases that would otherwise be avoided if their constitution had not been markedly weakened on account of hemorrhage, anemia or cardiac or renal complications dependent primarily upon the uterine growth. When we consider that these tumors kill one-third of the patients, and that perhaps fifty per cent. of the remaining two-thirds succumb to diseases made possible on account of the tumor, we are justified in operating upon them even when the tumor is in the beginning stages and the symptoms complained of are comparatively slight. Surgical treatment in this stage produces permanent results and as a rule is not associated with a large mortality.

It is difficult or impossible at the present time to say which tumors of the uterus should not be removed. It has been agreed that we are not justified in removing a fibroid of the uterus if it does not distress the patient and is not rapidly progressing in development. On the other hand it is generally acknowledged that we should not subject a patient to operation for the removal of a uterine fibroid if the fibroid is not producing serious local or general symptoms, if the patient is in a poor physical condition and is suffering from independent diseases in other portions of the body. In these cases the danger of the operation over-balances the possible benefit to the patient from removal of the tumor.

If the patient is in a fairly good condition and is suffering from a fibroid of the uterus, the opinion may be given that the tumor should

be removed in all cases. If serious symptoms are not complained of, it is probable that the tumor will develop and sooner or later pressure effects, hemorrhage or other complications will demand surgical care. The advantage of operating before these diseases become serious is that in the early stages the operation is not dangerous. The statement frequently made that uterine tumors do not grow after the menopause is not longer believed in. While sometimes a temporary cessation in development appears to follow the climacteric, and while the hemorrhages may occasionally be less severe after this period has passed, as a rule a fibroid that has produced marked symptoms before the change of life will continue to cause similar symptoms during the remainder of the patient's existence. For this reason the occurrence of the menopause does not contraindicate, or in itself demand or modify in any way, the indications for surgical treatment.

Many times special symptoms or complications developing in the course of uterine fibroids point for or against operative treatment. The size of a uterine fibroid, in itself, rarely presents a cause for removal. A moderately large tumor may be entirely innocent and may produce few symptoms. As a rule, however, a fibroid that is large may be expected to become larger, and should be removed. Pressure symptoms in these cases are common and complications are likely to occur. For this reason we are justified in advising operative treatment for all fibroids that fill the true pelvis.

Pressure symptoms in all cases constitute good cause for operation, unless the general state of the patient contraindicates any surgical measure. The urinary and intestinal symptoms that may be expected to occur should a fibroid produce marked pressure are avoided by early operative treatment.

Pain may or may not demand operation. If the pain in cases of uterine fibroid is not associated with severe hemorrhage, and occurs only at the menstrual period, it may be considered an insignificant symptom. On the contrary if there is associated with the pain marked bleeding, pressure symptoms or cardiac complications, if the pain is distressing or occurs between the menstrual periods, an operation should be performed at once.

Hemorrhage may or may not be severe enough to demand operation. If the bleeding is profuse and recurs at frequent intervals something should be done to prevent it. We should not wait in these

cases for the patient to become markedly anemic before advising operative treatment, nor should valuable time be wasted with palliative efforts to control the hemorrhage. Curettage is positively contraindicated to control hemorrhage from a uterine fibroid. Ligation of the uterine arteries is many times not efficient, and should be recommended only when the patient's condition will not permit of a radical undertaking. Hemorrhage is a serious symptom in all cases of fibroids, and as a rule is sufficiently important to advise removal of the growth.

Inflammatory complications in the fibroid itself, or in the tubes, ovaries or appendix, are frequently found in advanced cases of fibroid disease. These conditions may be chronic and not serious, or they may be acute and dangerous. Suppurative inflammations require operation in all instances. It is dangerous to allow a patient who has a fibroid of the uterus to go untreated if a pus tube is present. The same is true, to a certain extent, in chronic inflammations of the appendix. All of these serious, inflammatory complications offer indications for operative treatment. Hematomas in the ovaries are to be considered complications of uterine fibroid. These cases should be operated upon without delay.

The occurrence of degeneration in the uterine fibroid is valuable as an indication for operative treatment. Sometimes these degenerations are harmless in character, but many times malignant changes occur in these growths. It is generally agreed that a fibroma may become sarcomatous, but it is improbable that a fibroid will ever become cancerous. It is true that many times carcinomas develop in a uterus the seat of fibroids, but as a rule these are independent growths. It has been shown that when a carcinoma attacks a uterus that is involved with fibroid disease, the body of the womb is most frequently affected by the cancer. This is the reverse of carcinomas of the uterus occurring without the presence of fibroids, and is of importance in performing radical operations for fibroid growths. When we remember that carcinoma of the cervix of a fibroid uterus rarely occurs we feel justified in doing a supra-vaginal amputation of the uterus in preference to a complete hysterectomy.

According to Gusserow, Strassmann, Lehmann, Wilson, Williams, Webster and others, pronounced cardio-vascular changes occur as the result of uterine fibroids in from twenty-five to forty per cent. of the cases. Myocardial and chronic valvular changes are most

be removed in all cases explained of, it is probably later pressure effects, and demand surgical care. The cases become serious is dangerous. The state not grow after the men- times a temporary or climacteric, and when severe after this period produced marked symptoms cause similar symptoms. For this is contraindicate, or conditions for surgical

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present time it appears that in the hysterectomy is the operation gener- of the uterus. This operation which the entire body of the womb is in which multiple small interstitial probably indicated in cases of multiple of the womb. This operation should to complete hysterectomy whenever pos- to leaving the cervix on account of involvement is not sufficiently borne to warrant us in doing complete hys- amputation is more rapidly done than the uterus, and is not so apt to be associated

indicated in all pedunculated tumors of the body where the tumors develop from the uterine mucosa. may be done in cases of multiple subserous growths

in which pregnancy is desired. An abdominal myomectomy should never be sufficiently extensive to involve the lining of the uterus. The danger in these cases is from infection.

Panhysterectomy should be selected only in cases in which the cervix is involved, either with the fibroid process or with malignant degeneration.

It is not necessary in removing a fibroid uterus that the appendages be taken away in all cases. If an ovary is in a practically healthy condition it is better practice to leave it than to remove it. For the reason that many times the uterine appendages are markedly affected by adhesions or inflammatory processes, the removal of one or both of the ovaries will usually be part of the operation for uterine fibroids. The appendix should always be inspected. It has been found diseased in a large percentage of the cases.

Palliative operations for fibroid of the uterus have little or no place in the surgery of to-day. Ligation of the uterine arteries is extremely unsatisfactory. Operations on the ovaries should never be performed with the idea of preventing symptoms, while curettement of the uterine cavity is a dangerous operation and can not be expected to improve the condition of the patient, or to mitigate symptoms.

CANCER OF THE UTERUS.

The treatment of cancer of the womb is entirely surgical. No other method can be expected to permanently relieve these cases. What we should aim at in dealing with these serious and too often neglected growths is early recognition. We should devise methods of discovering and eradicating these growths when they are in the first stages, rather than to formulate operative procedures for far-advanced cases.

A study of the mortality following the operative procedures for cancer of the womb is of little value in determining the indications for treatment. This is true for the reason that we do not know the extent of the disease, even after the operation is performed, and that the local symptoms or the general condition of the patient seldom indicate the extensiveness of the carcinomatous involvement. The location of the growth, or the degree of its local invasion, does not assure that glandular infection is or is not present. The same is true when enlarged glands can be palpated. It is impossible to say, before a microscopic examination is made, that lymphatic enlargement is the

commonly met with and are most important. In all of these long-standing cases renal disease may be expected. It is probably true that the changes in the heart sometimes constitute the demand for operative treatment in uterine fibroid. It is true they make the immediate prognosis more grave, but in some of the cases marked improvement in the cardiac symptoms has followed removal of the tumor. Some years ago Pozzi and Sebileau recognized in the cardiac complications of uterine fibroids an indication for operative treatment. They also recognized that in this complication there was a grave factor in the prognosis of the case.

Kidney involvement due to cardio-vascular changes, or, as is more often the case, to pressure from the tumor, gives an indication for operative treatment. If the growth has advanced to the stage that it interferes with the kidney function operation should be done at once. These symptoms always progress in severity and the patient's general condition does not improve but becomes gradually worse. It is probable that sterility seldom if ever is good cause for removal of fibroids. Although it is true that pregnancy has occasionally occurred after myomectomy has been performed, we are not warranted in assuming that this will be the rule and for this reason an operation should not be performed with the idea of making the patient fertile.

Operation of Choice.—At the present time it appears that in the majority of cases supra-vaginal hysterectomy is the operation generally selected for relieving fibroids of the uterus. This operation should be done in all cases in which the entire body of the womb is involved in the growth, or in which multiple small interstitial fibroids are present; it is also probably indicated in cases of multiple subserous fibroids of the body of the womb. This operation should be performed in preference to complete hysterectomy whenever possible. The objection of Richelet to leaving the cervix on account of its being the seat of cancerous involvement is not sufficiently borne out by the history of these cases to warrant us in doing complete hysterectomy. Supra-vaginal amputation is more rapidly done than complete removal of the uterus, and is not so apt to be associated with bleeding.

Myomectomy is indicated in all pedunculated tumors of the body of the womb, or where the tumors develop from the uterine mucosa. This operation may be done in cases of multiple subserous growths

has rendered involvement of the bladder positive, little can be expected by performing a radical operation. If the location of the growth and the position of the uterus are such as to make us strongly suspect an involvement of the bladder, the uterus should be removed and a portion of the vesical wall excised. These cases will rarely be cured.

Involvement of the rectum is in most instances an indication pointing to an extensive growth. A radical cure can rarely be expected if the disease has advanced to this stage.

Fixation of the uterus, unassociated with inflammatory conditions, usually means extensive involvement. As a rule, a radical operation cannot eliminate the carcinomatous tissue in these cases. I do not mean to say that fixation of the uterus contraindicates radical operation in all cases, but a recurrence can be expected in most of the patients if the disease has advanced to a stage that renders the uterus practically immobile. The extensiveness of the ulcerative lesion of the cervix, or the amount of involvement of the vaginal tissue, is no criterion of the incidence of the disease higher in the pelvis. These cases may be unassociated with glandular involvement.

If a carcinoma of the uterus has advanced to a stage in which symptoms pointing to involvement of the ureters are present little can be expected from a radical operation. It is probable that in some of these cases an operation that corresponds to the one practised by Sampson may occasionally cure a patient, but, as a rule, more is to be lost by these operations than by letting the patient succumb to the disease, especially when the case is first recognized in a stage so advanced as to indicate ureter involvement.

More extensive operations that not only remove the lymphatics of the pelvis but all tissue between the uterus and the lateral pelvic walls, and that are associated with resections or other operative procedures on the ureters, the bladder and the rectum, are seemingly unjustifiable. In favor of these operations are the facts that the patient with advanced disease cannot be cured by any other course, and that occasionally a life may be saved by these means. Many things, however, speak strongly against these procedures. If the disease has advanced to a stage that renders such operations necessary, as a rule the resistance of the patient has been extremely lowered; for this reason they are attended by a high mortality. Furthermore, all of these operations are associated with inconvenience of the urinary

result of carcinomatous invasion, or is dependent upon secondary infection. For these reasons a discussion of the various views of different authorities regarding the treatment of carcinoma of the uterus will be of little avail to most men who deal with this condition.

At the present time there seems to be only two procedures indicated in dealing with cancer of the womb. If a case is recognized in the very early stages, possibly before a microscopical examination could be positive, vaginal panhysterectomy should be the operation of choice. This operation should always be accomplished if the case does not clearly show that it has advanced beyond the hope of radical relief. All cases that do not offer indications for vaginal removal should be subjected to palliative operations only. It is true that by this method certain cases may be lost that probably could have been cured by more extensive operations. On the other hand it is believed that more lives will be prolonged and perhaps as many patients permanently cured by following this method than by performing extensive and sometimes fatal operations for certain well-advanced cases. The results following extensive operations that attack the retroperitoneal tissue and practically clean out the pelvis are probably not more encouraging than are those where cases of carcinoma of the uterus are treated by vaginal hysterectomy. It is improbable that more cases will be lost by recurrence when vaginal hysterectomy is done than from the direct effects of the more serious operations, while in the hopeless cases a permanent result cannot be expected from either method. It is possible that future experience and a more extensive trial of the prolonged and serious operation may show that this should be the method of choice in dealing with border-line cases.

The question of removal of the lymphatics is a disputed one. Of course it would be better to remove these regional glands if it could be done without materially increasing the severity of the operation. When we consider, however, that local recurrence is the rule, that enlarged glands are not always carcinomatous and that glandular involvement, according to Sampson, may not be expected in over sixty per cent. of the moderately advanced cases, I believe we are not justified in removing the lymphatic glands in connection with most of these operations. An extensive local growth, occurring in a patient whose general condition was extremely good, would be an exception to this rule.

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has rendered involvement of the bladder positive, little can be expected by performing a radical operation. If the location of the growth and the position of the uterus are such as to make us strongly suspect an involvement of the bladder, the uterus should be removed and a portion of the vesical wall excised. These cases will rarely be cured.

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expelling powers, and many times produce infection of the bladder, of the ureters, or even of the kidneys. In consequence the mortality of these procedures, due directly to the operation or to complications that closely follow, must be expected to be high. Another fact that contraindicates these methods is that recurrence is to be expected if the disease has advanced to a stage that renders resection of the ureters necessary to apparently eliminate it. Owing to the fact that the mortality following these operations and the percentage of permanent cures cannot, at the present time, be determined it is impossible to say that these operations should never be undertaken, or that they should be performed as a routine practice.

If a disease has progressed to a stage that renders radical removal of the tumor improbable, or if the general condition of the patient is such as to contraindicate a serious operation, palliative surgical measures should be advised to temporarily relieve, and to prolong the life of all patients suffering from carcinoma of the womb. The operation in these cases should attempt to remove sloughing and infected tissue. There is no object in removing with a sharp curette or with a cautery, carcinomatous tissue that is firm, that does not bleed easily, or that is not infected.

Palliative operations to relieve intestinal or urinary obstructions following complications in cases of cancer of the womb will rarely be necessary. These procedures are unsatisfactory, and should be adopted only when immediate symptoms demand.

XIX. DISEASES OF THE BREAST.

MASTITIS.

Acute inflammation of the breast demands surgical treatment only when the condition has advanced to suppuration. Open incision and drainage should then be done for all of these cases. If the collection of pus is small, or is limited to one lobule of the gland, a single incision will be entirely sufficient to secure a good result. If several lobules of the gland are involved in an acute suppurative process multiple incision should be made in preference to removal of the organ. Amputation of the breast should never be undertaken in cases of diffuse or localized acute suppurative mastitis. Multiple incision will give temporary relief to these patients. It is not a serious procedure and can be done in many instances without the use of general anesthesia. On the other hand amputation of the breast is a serious operation when the organ is in an acute inflammatory state. If the gland is so disorganized and thoroughly impregnated with the infectious material that its complete removal is essential to secure a permanent result, then the operation should be done after the acute inflammatory conditions have subsided, which they will invariably do if multiple incisions have been made and efficient drainage secured.

Chronic mastitis following acute suppurative conditions, or occurring as a primary disease, gives us in the majority of instances, an indication for the removal of the breast. In the chronic inflammatory disease the axillary contents should be removed at the time the breast is amputated. If the condition has followed an acute suppuration in the gland, and there are no suppurating or markedly enlarged or tender glands in the arm-pits, then the axillary contents should not be removed at the primary operation. These glands will in many instances become normal and they serve a good purpose in protecting the general system when a breast has been amputated for diffuse suppurative conditions.

GALACTOCELE.

A galactocoele affords a reason for operative treatment when the condition is of long standing, or is of large size, does not tend to disappear spontaneously and does not yield to compression or massage treatment. Aspiration of a galactocoele is in the majority of instances

THE BREAST

...ent result. The opinion is ... the idea of permanently re- ... fluid, or of moderate size, ... followed by complete healing by ... producing a permanent cure. ... excision is the best method ... hard or soft, but is of very large ... will be the method of choice in ... of the mammary gland should

TUBERCULOSIS.

... gland is usually secondary to tu- ... It does occur, however, under ... to the primary localization ... gland.

... is entirely surgical. If there ... tuberculosis in superficial portions of the ... has occurred, incisions fol- ... may be advisable. If, on the other ... is extensive and is disseminated ... of the gland, amputation followed by ... is positively demanded. This treat- ... of primary tuberculosis involving the ... changes in other portions of the ... and are producing serious effects on ... operative treatment for tuberculosis in ... undertaken.

ACTINOMYCOSIS.

... mammary gland, like tuberculosis, is usu- ... of the disease. If the condition, however, ... gland, and does not yield to internal ad- ... of potassium iodide, the entire gland ... axilla dissected. In cases of actinomy- ... and with extensive actinomyeotic infections ... no surgical operation should be advised ...

CYSTS.

There are many forms of cystic growths that have been observed to occur in the mammary gland. Some of them are rare, some of them are innocent and some of them are serious in character. They all, however, are markedly similar from the standpoint of indications for treatment.

The statements made by various authorities regarding the indications for treating these cysts are so different in character that little can be gained by following the advice of any one of them. Robert Abbe is of the opinion that the great majority of these cysts are innocent in character, and that aspiration is entirely sufficient to produce a cure. The reports from Johns Hopkins Hospital contradict, in a great measure, the advice of Abbe. A study of the cases treated in this institution shows conclusively that a certain percentage of these cases are malignant in character, and that aspiration or incision is not entirely sufficient to secure a permanent result in every case. The opinion may be warranted that small cystic growths in the mammary gland that have existed for a considerable period of time, and that are not rapidly increasing in size, present an indication for aspiration and, if necessary, excision of the growth. Amputation of the breast should never be advised in these cases. If, on the other hand, the growth has increased rather rapidly in size, the patient is past forty years of age, and a large portion of the gland is involved in the cystic affection, complete amputation of the breast, followed by dissection of the axilla, should be advised and carried out without delay. It is true that if this advice is followed an unnecessarily radical operation will be occasionally performed, but the possibility of malignancy in these cases is so great that the treatment herewith advised seems to be entirely justifiable. All of these doubtful cystic growths must be considered malignant until they have been proven to be benign in character.

The arguments for operative treatment in benign cystic growths of the breast apply with equal force to benign and doubtful solid tumors. Small non-adherent and slow-growing, solid tumors call for enucleation or excision, if they inconvenience the patient or if they produce mental annoyance. Amputation of the breast is not indicated in this class of cases. If, on the contrary, a solid tumor that is benign in character develops in a woman who is past forty years of age, operative treatment should be advised without delay. It is

not necessary that the tumor should be increasing in size, or that it should involve a large portion of the gland before we are called upon to operate. The patient should be informed that the nature of the growth cannot be positively determined without an exploratory incision; should be advised to be prepared for a radical operation; and should be told that exploratory incision will be made and microscopic diagnosis of the tumor effected while she is on the table. If this diagnosis shows the growth to be malignant, a radical operation should follow at that time. This is the only safe and legitimate way to deal with these doubtful, solid and cystic growths that not infrequently involve the female breast. Delay until the condition has progressed to the stage so as to make its malignancy positive, or until the length of time has proved its benign nature, is unjustifiable. We should recommend to all of these patients operative measures that will at least prove clearly the nature of the growth.

SARCOMA.

A sarcoma of the breast presents in all cases a radical indication for operative treatment unless the disease has advanced to a stage in which extensive metastasis has occurred, or in which the general condition of the patient is such that a thorough operation would probably speedily terminate life. Palliative measures or delay are not warrantable in dealing with any sarcomatous growth in the mammary gland.

CARCINOMA.

At the present time operative treatment offers the only hope of permanently curing carcinomas of the breast. If a carcinoma is small, is of slow growth, involves only a small portion of the gland, has not involved the skin and shows no signs of axillary extension, complete excision of the breast, with removal of the fascia covering the pectoral muscles, and thorough dissection of the axilla will be entirely sufficient to secure a permanent result, and should be the operation of choice. Complete removal of the pectoral muscles is unnecessary, and even unjustifiable, when a radical operation for carcinoma of the breast can be performed in the very early stages.

If the growth is of such a character and from the clinical history and the examination there is reason to believe that a large portion of the gland has been invaded, a most extensive and thorough operation is indicated. Dissection of the cervical triangle probably

does no good in these cases, but the opinion is offered that it should be made, as little is to be lost by extending the operation to this region, and occasionally the progress of the disease may be arrested by attacking the supra-clavicular space.

In all cases of moderately advanced carcinoma of the breast, in which the disease may be said to be in a doubtful stage regarding the securing of a permanent cure, a most extensive operation should be performed without delay. If, however, a carcinoma of the breast involves a large area of the skin, a recurrence can be expected to follow such an extensive operation. Although this statement is true it does not contraindicate the performance of this serious operation, provided we fortify ourselves against the probability of a speedy recurrence. If the disease has attached itself to the thoracic wall, and there is reason to believe that the ribs and intercostal tissue have been invaded, no permanent cure can be expected. The same is true of the great majority of rapidly growing carcinomas that have progressed to a stage in which extensive involvements of the glands of the neck have occurred. Of course it is unnecessary to state that no surgical operation should be performed with the idea of obtaining a permanent result if metastatic tumors are found in different parts of the body.

It will occasionally happen that palliative operations will be justifiable to relieve patients suffering from advanced carcinoma of the breast. What we should aim at in these operations is to eliminate suppuration and to convert, if possible, an open, suppurative and bleeding surface into a closed tumor. The entire breast should be removed in most of these cases, and skin flaps provided to cover the growth easily. No axillary or cervical invasion, and no removal of the thoracic muscles, is called for in performing this palliative operation.

Removal of the ovaries, recommended and practised by Beatson, and later commented upon favorably by Abbe, Boyd and others, has no place to-day in the treatment of carcinoma of the breast. Doubtless this operation has been discarded for good reasons.

XX. THE THORACIC CONTENTS.

The indications for the performance of operations that open the pleural cavity are many times modified in a great measure by the dangers attending the production of pneumothorax. This is especially true in considering all operations not associated with pleural adhesions or unilateral, pulmonary compression. At the present time there are a few recognized methods suggested and practised to overcome this objection to intra-thoracic operations. While it is true that none of these methods has solved the problem of overcoming the dangers of an operative pneumothorax, their advantages are well known and in the performance of any intra-thoracic operation, pneumothorax should be avoided if possible.

It is generally accepted that in operations for the relief of suppurating conditions in the lung, it is a wise procedure to divide the work into two stages, unless the pleura is adherent in the vicinity of the operative wound. Packing, or suturing of the parietal pleura to the pulmonary tissue will usually succeed in producing pleural adhesions. If it is impossible or inadvisable to do a thoracic operation in two stages, an artificial pneumothorax, according to the method of Murphy, should precede the operation. In cases in which the occurrence of pneumothorax cannot be avoided the pleural opening should be very small so as to allow the pneumothorax to develop slowly. The plan of Dollinger, which consists in producing a slowly-developing pneumothorax the day before the operation is to be done, may be found applicable in some instances.

The work of Sauerbruch and Mikulicz regarding the performance of intra-thoracic operations under the influence of a negative pressure of ten millimetres of mercury will doubtless modify, to a certain degree, the indications for intrathoracic surgery. The experiments of these men strongly suggest that the dangers of pneumothorax occurring during intra-thoracic operations can be, in a great measure, diminished by operating in a cabinet with a negative pressure of ten millimetres of mercury. While this method, at the present time, is in a great measure untried, it may result in successful operations on the thoracic contents that are, with the present technique, perhaps unjustifiable. The removal of pulmonary tumors, mediastinal growths, and operations that extend into the posterior

mediastinum, may become legitimate surgical procedures as the development of this apparently decided advance in thoracic surgery progresses. At the present moment it is the exception and not the rule if it is found best to attempt removal of most pulmonary or mediastinal tumors; and it is rarely possible to operate successfully for most affections involving the posterior mediastinum.

INJURIES OF THE THORACIC WALLS AND LUNGS.

Wounds extending into the pleural cavity may or may not require operative interference. The great majority of these patients make rapid and complete recoveries without operation. If operation is indicated in this class of injuries it is required to arrest hemorrhage, to relieve compressing pneumothorax, to evacuate a hemothorax, to assist in relieving collapse of the lung, or to drain purulent collections resulting from infection.

Hemorrhage resulting from injuries of the thoracic wall, but not extending into the lung, is rarely severe enough to require operative treatment. Injury to the larger intercostal arteries seldom, if ever, occurs unless one or more ribs have been injured at the same time. In the great majority of instances bleeding from an intercostal artery ceases spontaneously. If intercostal bleeding is so severe that it must be artificially arrested, it is rarely necessary that an operation will be required. A tampon corresponding to the one recommended by Senn, which is a modification of that described by Langenbeck, will be found efficient in stopping hemorrhage from an intercostal artery in almost every instance.

Hemorrhage from an internal mammary artery may be serious. Usually it does not stop spontaneously. If the wound is not sufficiently large to permit control of the hemorrhage either by clamping the vessel or by including it in the grasp of a suture, operation should be resorted to without delay. Packing the wound is usually not sufficient to stop the hemorrhage in these cases. If the accidental wound is situated in such a position that enlarging it, or operating through it, is likely to injure some important organ, or to reopen the pleural or pericardial cavities, the artery should be ligated by removing a portion of the costal cartilage that is above the point of bleeding. This procedure will no doubt require general anesthesia. If the patient's condition is so serious that general anesthesia is contraindicated, the hemorrhage may be stopped by introducing a large

curved round needle, threaded with heavy silk, into the intercostal space, close to the sternum; passing the needle under the mammary artery, and bringing it through the skin to the outer side of the vessel. A ligature passed in this manner, and tied over a piece of gauze, will control the bleeding. This should not be the method of choice, but should be resorted to only when a safer and more definite procedure cannot be employed on account of the general state of the patient.

Pneumothorax sufficiently serious to warrant operative interference rarely occurs when the lung is not involved in the injury. It has been shown, however, by Hodenpyl that cases of fatal distending pneumothorax do occur as a result of injuries to the thoracic wall. If there is reason to believe that the pneumothorax is increasing and gradually producing a severer effect on the patient, operation is indicated. Aspiration should be first resorted to. If this does not give relief the thoracic cavity should be opened by reopening the wound or by making an intercostal incision. This does not always relieve the serious symptoms associated with a distending pneumothorax; but the reports of Gross and Klett seem to warrant advising an intercostal incision if aspiration does not relieve the dangerous symptoms. The majority of the cases of pneumothorax that produce serious symptoms are associated with more or less complete collapse of the lung. It is probable that in most of these cases, in which the lung is not wounded, the serious symptoms are due more to the pulmonary collapse than to the pneumothorax. Of course, pneumothorax and pulmonary collapse co-exist; and the pneumothorax cannot be relieved without producing some improvement in the collapsed lung. If intercostal incision is followed by no improvement, inflation of the collapsed lung should be tried with the Fell-O'Dwyer apparatus. If this is unsuccessful and it can be seen that the patient's general condition is becoming more serious, an anesthetic should be given and the thoracic wound enlarged sufficiently to grasp the lung, draw it to the surface and suture it to the thoracic wall.

It is doubtless very seldom that any of these measures will be found necessary in dealing with injuries that do not involve the lung itself. If they are indicated, and if after they have been applied in the order recommended the patient still shows no signs of improve-

ment, there is little more that can be done in an operative way that offers any chance of giving relief.

An extensive hemothorax that may occur in this class of injuries should not be interfered with as long as it does not produce serious symptoms. If there is reason to believe that the presence of blood and air in the pleural cavity is continuing the symptoms, or is producing serious compression, the treatment advised to relieve the pneumothorax will at the same time evacuate the hemothorax. If a hemothorax shows no tendency to disappear spontaneously, it should be aspirated—according to Tuffier and Miliani,—after it has been present about two weeks. If the blood in the hemothorax becomes clotted, and will not absorb or cannot be aspirated, LeBoutillier advises that the clots should be removed by operating. He maintains that the prolonged presence of a hemothorax results in permanent changes in the lung and pleura that are sufficiently serious to warrant operative intervention to prevent their occurrence. It will rarely be necessary to do an operation for the removal of clots in the pleural cavity.

If a hemothorax becomes infected it should be treated by drainage regardless of the condition of the blood. If clotting has already occurred, which is usually the case, intercostal incision will not afford sufficient drainage. If the contents of the pleural cavity are free from solid masses, intercostal incision may suffice in some cases. The rules governing the treatment of an empyema apply to these cases.

Gunshot or stab wounds of the pleura are serious injuries, but rarely present an indication for operative treatment. In the majority of these cases the patient will recover without an operation; or the damage to important organs is so great that death occurs in a short time. Rupture of the lung, without skin wounds, is as important, and should receive the same treatment, as injuries to the lung associated with wounds in the thoracic wall. The fact that a wound of the lung is exposed to infection through an external wound, does not modify the treatment in these cases. Operations on the pleural cavity and lung for acute injuries are so serious that we are not justified in any case in subjecting a patient, who is suffering from a perforating wound of the chest, to anesthesia and operation to disinfect the primary injury. The risk of infection is not so great as the anesthesia and operation at this time.

Operative treatment for wounds of the lung is usually advised

against by most surgeons. The recommendation that is generally given is that the orifice of the external wound be cleansed, the wound sealed, and the chest immobilized. König, Rüdinger, Tillmanns, Langenbeck, Billroth, Senn and others are advocates of the conservative method in treating wounds of the lungs. Gross, Klett and Amburger believe that operation is indicated in most of these cases. Klett is of the opinion that operations undertaken to produce primary disinfection of the wound should be performed. The mortality from wounds of the lung, when considered in relation to the extent of the injury and the conditions present, as has been done by LeBoutillier, Nelaton, Tuffier and Miliani, shows clearly that a radical stand for operative treatment, or conservatism, is not justified. Although it is true that most of these patients do not require surgical treatment, it is equally true that an operation is indicated when certain conditions are present. Hemothorax and pneumothorax, when present to a marked degree, produce a mortality, according to Nelaton, of 50 per cent. when not treated surgically. The results in similar cases when treated by operation show that in some instances surgical treatment is indicated in wounds of the lung.

Hemorrhage is a most important consideration in all wounds of the lung. It is generally agreed that hemorrhage from the larger vessels at the base of the lung is fatal in a very short time. Matas says that the loss of blood occurs so rapidly in these cases that there is no possible hope of benefiting the patient by any operation. Quite extensive wounds of the lung may bleed profusely for a short time, but the bleeding usually stops spontaneously if the chest is immobilized. Compression of the wounded lung by hemothorax and pneumothorax assists in stopping the hemorrhage. Although it is true that the majority of pulmonary injuries are not associated with bleeding sufficiently severe to require operative treatment, cases occasionally occur in which the hemorrhage will terminate life unless mechanical interference is employed to stop the bleeding. If the hemorrhage occurs into the pleural cavity and is producing an exhaustive effect on the patient, operation is indicated before the patient is moribund. It may often be impossible to determine in these cases that it is the loss of blood that is producing such a serious effect on the patient. In the great majority it is hemorrhage, pneumothorax, and pulmonary collapse that are responsible for the serious progressive symptoms. If the patient is gradually failing, surgical treatment is indicated at

once. Although true that compression of the lung with liquids or gases assists in stopping pulmonary hemorrhage; when hemothorax and pneumothorax exist, and the patient is gradually sinking, operative treatment is justifiable in attempting to give relief. Intercostal incision, or re-opening of the wound, should be done under local anesthesia. According to Klett this will do good in some cases by allowing the atmospheric air to come in contact with the bleeding surfaces. If the hemorrhage still continues, general anesthesia must be resorted to and the thoracic cavity exposed. As hemorrhage in these cases is usually associated with collapse of the lung, the lung should be grasped at its injured portion, drawn to the surface, and held in this position by suturing. The bleeding should then be stopped by using ligatures or sutures, or by tamponing. DaCosta and Kopfstein are of the opinion that packing is entirely sufficient to control the hemorrhage.

If severe and uncontrollable hemorrhage occurs from an injured lung into a bronchus, compression of the lung according to the method advised by Murphy, or by injecting salt solution into the pleural cavity, should be resorted to. Uncontrollable hemorrhage into a bronchus may rarely be expected to occur, but if it is present little can be done to arrest it except compression of the lung. The observations of Gross and Klett suggest strongly that the injection of gases or liquids into the pleural cavity are of sufficient value in these cases to be given a trial.

When serious, progressing pneumothorax occurs after an injury to the lung the same treatment is indicated that has been advised for this condition when it is present following wounds that extend into the pleural cavity only.

Pulmonary collapse as a result of injuries to the lung, is, in some instances, a serious condition. There is a difference of opinion regarding the conditions under which collapse of the lung may be expected to occur. König makes the statement that complete pulmonary collapse supervenes even when a small opening is made into the pleural cavity. Skoda and Reinboth maintain that the collapse of the lung comes on slowly when the opening into the pleural cavity is small. On the other hand, Patrick and Frazier believe that pulmonary collapse follows only when large openings are made into the pleural cavity. Gerulanos says that the opening into the pleural cavity must be larger than the cross-section of the trachea for pul-

monary collapse to occur. Smith is of the opinion that the position of the pleural opening is an important factor in producing collapse of the lung. Although these statements are of little value in arriving at a conclusion, it is generally known that pulmonary collapse may, and sometimes does, follow injuries to the thoracic wall and lungs; and that in some instances, it has a very serious effect on the patient. If there is reason to believe that pulmonary collapse, with or without hemorrhage, is gradually lowering the vitality of the patient, the pleural cavity should be opened under local anesthesia. If this does not relieve the symptoms the chest cavity should be explored, the lung drawn to the chest wall and held in position by sutures. Inflation of a collapsed lung is contraindicated if a wound of the lung exists.

Hemothorax following wounds of the lung should not be aspirated, unless serious symptoms demand it, until the wounds in the lung have had sufficient time to heal to some extent. If no infection occurs the aspiration should not be undertaken until about the fifteenth day following the injury. If, at this time, the quantity of blood in the pleural cavity is large and is not disappearing, a portion of it should be removed by aspiration. A second aspiration should be done later if necessary.

Infection in wounds of the pleural cavity or lung, is a consideration of secondary importance when compared with severe hemorrhage or pulmonary collapse. Primary operative interference should never be undertaken in these cases for the purpose of cleansing the wound. In treating these wounds, every precaution should be taken to prevent infection; but no operative interference should be advised to prevent or relieve an infection unless the indication is marked. Inflammations of the pleura, following injuries, usually become suppurative and should receive the treatment that is indicated for an empyema. Inflammatory conditions in the lung itself, that result from wounds or subcutaneous lacerations, should never be subjected to operative treatment unless a pulmonary abscess can be recognized, or is strongly suspected. Collections of pus that form in the lung as the result of infection of a wound should be drained. If the infection in the pulmonary tissue is so virulent and extensive that localized suppuration will not occur, little can be expected, in the way of giving the patients relief, by subjecting them to operations. These patients, almost without exception, succumb to the infection, and I

am of the opinion that more of them will die if an operation is attempted than if nature is not interfered with in its efforts in limiting the infection. All that should be hoped for in extensive infections of the lung is that an abscess will form.

Although it is true that surgical interference will be contraindicated, or can do no good, in the great majority of thoracic wounds, I believe that cases occasionally occur in which operation will be of benefit to the patient—in stopping hemorrhage, in relieving excessive pulmonary compression, or in aiding a collapsed lung to expand. The cases that require operations for these conditions are very serious indeed; but the reports of Nelaton, Klett and others strongly suggest that occasionally a life may be saved by resorting to prompt surgical interference in properly selected cases.

WOUNDS OF THE HEART.

Although operative treatment for penetrating wounds of the heart has been practised but nine years the reports in the cases that have been under operation are sufficiently encouraging to show that operative intervention is indicated in all such wounds, unless the injury and loss of blood is so severe as to terminate the life of the patient in a very short time. Many of these cases will die, no matter what treatment is resorted to. It may be possible that a few of them will recover without operation. In many of the instances, however, much can be done to save life. If left untreated it is probable that most all of them would die. The mortality in the sixty cases that have been subjected to operation is, according to Stewart, sixty-one and three-fourths per cent. Considering the mortality of the operated cases, according to the year in which the operation was performed, there does not seem to be any progressive increase or decrease of the death rate. This, in all likelihood, is due to the fact that the fate of the patient is doubtless dependent upon the extent of the injury and not upon a modification of the technique that is used. The mortality in these cases is very large if the injury is sufficiently severe to produce excessive bleeding at once. If the patients are able to survive a few hours after the injury has occurred, they, as a rule, recover if operation is done. The cases of Nietert, Fontan, Brenner, and Pagenstecher, in which the patients survived from six to sixteen hours before operations were performed, show that recovery was complete in all. On the other hand the case of Lonzo, in which the

operation was done at once, succumbed fifteen minutes after the completion of the operation. It is probable that Lonzo's patient would have died if he had not been operated upon. These reports are not cited to advise delay in these operations, but to show that wounds of the heart differ greatly in severity; and that those that are not sufficiently serious to terminate the life of the patient in a short time, stand a fair chance of recovery if operation is not delayed too long.

Any wound of the heart that is serious enough to bleed, presents a positive indication for operative interference. If the patient has survived two or three hours after the injury, and does not appear to be moribund, the field of operation should always be prepared before work is begun. If, on the contrary, it seems likely that the delay occasioned by the preparation of the operative field may be valuable time lost to the patient, no aseptic preparation should be tried. The reports of the cases treated by operation are of little value in determining the advisability of preparing the field before operating upon these cases. Gibbon is of the opinion that in one of his cases valuable time was lost in making this preparation. He believes that should he be called upon to treat a similar case, he would not be justified in subjecting the patient to this delay. Although no definite rule can be given regarding this matter of preparing these patients for operation, preliminary preparations should always be done if there is reason to believe that it will not seriously interfere with the patient's chances of recovery. The most serious and rapidly fatal cases will probably die, no matter how soon an operation is done. In such cases we should give the patient the benefit of the doubt and resort to operation at once. No time should be lost in preparing the operative field.

The indication that demands operative treatment in all wounds of the heart is acute hemorrhage. If a cardiac wound is suspected, and the presence of hemorrhage cannot be determined, operation is not called for. Primary operative procedures, done with the idea of disinfecting the wound, are unjustifiable and should not be advised. Of course, infections of the cardiac region are serious conditions, but as a rule the patient's chances of recovery are decreased, rather than increased, by an effort to cleanse the primary wound. When it has been determined that an operation is indicated for a wound of the cardiac muscle, the question of general anesthesia must be considered. If the patient is in a serious condition no general anesthesia should

be used. Ninni, Parozzoni, Gardona, Tuzzi, Lonzo, Romoni, Rosa, Pagenstecher and others have resected the thoracic wall and sutured cardiac wounds without the use of a general anesthetic. If the condition is not so serious as to contraindicate general anesthesia the operation should always be done with the patient asleep.

The technique of dealing with these injuries and of exposing the wound is beyond the scope of this discussion. It may be said, however, that the experience of Elsberg, and the clinical observations of Stewart, Gibbon and others, clearly show that there is nothing to be gained by tying the cardiac sutures during diastole. Although it has been generally advised to suture cardiac wounds with interrupted sutures, Sherman and others are of the opinion that a continuous suture is as efficient as the interrupted, and is not so irritating to the pericardium. The pericardial cavity should be drained after all of these operations. If secondary hemorrhage occurs from the heart it is very desirable that the blood should find its way out of the pericardial cavity instead of remaining and preventing the expansion of the muscle. Drainage should also be used as a precaution against infection. Inflammations in this region are usually very serious, and as much of this work is done with hasty preparation, and is associated with accidental wounds, drainage, with the idea of preventing infection, should not be neglected. It occasionally happens that a patient recovers from the immediate effect of a cardiac injury, but dies later from a suppurative pericarditis. Tuzzi reports a case that succumbed to suppurative pericarditis twenty-two days after being injured. His report does not state that primary drainage was or was not employed after the operation was performed. Inflammations of the pericardium, following wounds of the heart are usually suppurative in character and demand the same treatment that is advised in pyopericardium.

ABSCESS OF THE LUNG.

Collections of pus in the pulmonary tissues call for drainage. The operation in these cases should consist of a rather extensive resection of the thoracic wall, and, if the pleura is adherent over the abscess cavity, opening of the abscess with the cautery. If pleural adhesions are not present it is advisable to perform the operation in two stages. The first operation should accomplish agglutination of the pleural surfaces by the use of sutures and gauze. The second should provide for drainage of the abscess cavity.

Tuberculous, pulmonary abscesses are, as a rule, no exceptions regarding the indications for treatment. Localized tubercular collections of pus that do not drain efficiently into a bronchus, and that are not complicated with advanced and extensive tuberculous changes, are perhaps best treated by drainage.

SUPPURATIVE ANTERIOR MEDIASTINITIS.

Collections of pus, or primary tumors, in the anterior mediastinum are generally amenable to operative treatment. The sternum should be trephined or partially resected, and the growth removed or drainage provided for, as the condition indicates. The danger of producing pneumothorax in doing these operations is slight; for this reason they are not attended with unusual danger.

EMPHYEMA.

Drainage in the most dependent part is called for in all cases of acute or subacute empyema. The advice given by Fürbringer to delay operation in these cases for three or four weeks should not be followed. Early operations produce permanent results in a majority of these cases in a short period of time. The cases of simple empyema that refuse to heal promptly have usually existed a considerable period of time before being subjected to operation. All chronic cases of empyema should be treated by efficient drainage. Cases of obsolete empyema according to Faisans, should not be subjected to operative treatment. In 1901 he reported a case of encapsulated empyema that was found in a man of fifty-five years of age, dead from cirrhosis of the liver, who had three and one-half litres of pus encapsulated in his pleural cavity. Faisans states that in all probability this condition had existed for forty years, and had not interfered with the patient doing military service. This is certainly a remarkable case. Although it is possible that such examples do occur, they are so rare that we can practically disregard them in considering the treatment of empyema.

All cases of chronic and long-standing empyema demand operative interference. The possibilities of the beneficial effects of compression to a lung infected with tuberculosis are not sufficient to allow long standing collections of pus to remain in the pleural cavity, even if the pus contains no organisms except the tubercle bacillus.

Cases of acute or subacute empyema should be given drainage without delay. If the patient's general condition is not sufficiently

critical to contraindicate the use of anesthesia, resection of a rib should be done at once. If the patient's condition is such that we do not like to subject him to general anesthesia, then we should not attempt to resect a rib at the primary treatment, but should be content with removing the pus, either by aspiration or intercostal incision. These measures should not be regarded sufficient to secure permanent results in all cases. Occasionally an intercostal incision, or even continuous aspiration, will result in a cure, but these measures cannot be relied upon. They, however, give temporary relief in all cases. If the patient's condition, after an aspiration or intercostal incision has been done, indicates that a permanent result will not be obtained, radical drainage and rib resection should be effected as soon as his general resistance warrants.

There are many to-day who do not agree with the statements made in the foregoing regarding the efficiency of continuous aspiration or intercostal incision. Many writers are of the opinion that these measures are entirely sufficient in treating most cases of empyema. While one may not be prepared to say that intercostal incision and continuous aspiration may not be looked upon more favorably in the future, still the opinion is here given that to-day, as a rule, they are not as efficient as rib resection and very thorough drainage, and can never entirely displace this procedure in treating the majority of patients suffering from empyema.

Aspiration is a simple procedure. It can be done under local anesthesia without pain. It is usually unaccompanied by noticeable shock and is of great importance in giving temporary relief to patients who are suffering from empyema and who are in such a serious state that general anesthesia is inadvisable. Aspiration alone, as stated, may be sufficient to produce complete and permanent cures in some cases, but it cannot be relied upon to produce more than temporary benefit.

Aspiration followed by the injection of normal salt solution, to replace the pus that has been withdrawn from the pleural cavity, has been advised by Bouchoin and Balz. Although they speak well of their method, it does not appeal to one as meeting the indications in most cases of empyema.

Continuous aspiration of the empyemic cavity, either by siphonage or by atmospheric pressure, is productive of good results in certain selected cases. The siphon drainage of Bulau may be of value in

instances that cannot safely be subjected to more radical treatment. The advantages of this method have been somewhat over-estimated by those who have advised it. Cases treated according to the method of Bulau are subject to the ill effect of pneumothorax to the same degree that they would be if intercostal incision or rib resection had been done. The continuous presence of the drainage tube for so long a period of time has certain disadvantages. In the treatment of tuberculous cases this method almost always results in secondary infection of the pleural cavity. Although this method may be indicated in certain patients, its good points are scarcely well enough marked to warrant us in accepting it as a measure that can replace more extensive drainage in the general treatment of empyemic patients.

The method of Perthes, that combines the methods of Thiersch and Storch, has certain advantages that Bulau's does not possess. The treatment advised and carried out by Perthes consists in removing the pus from the pleural cavity by continuous aspiration, and, at the same time, reducing the atmospheric pressure in the empyemic cavity by the use of an air-pump aspiration. The advantage of this consists of the good effects resulting from the assistance of the air-pump exhaustion in helping the lung to expand. The reports of Perthes, Van Hook and others, who have given this method a trial, speak very favorably regarding it. It has the added merit of not requiring anesthesia; in producing continuous aspiration; and in assisting the lung in re-expanding. The method evidently has a certain value or usefulness in properly selected cases. It is improbable, however, that it will ever be found as valuable as complete drainage in the great majority of empyemic patients.

There are certain cases of empyema that are of long-standing and associated with considerable contraction of the lung, that heal very slowly, if at all. If these cases have not been subjected to operative treatment, posterior rib resection, with an anterior intercostal incision, is all that is indicated at the primary operation. The drainage tube should be left in position until the lung has filled the abscess cavity. If the lung does not expand, and the abscess cavity does not heal, further operative treatment will usually be indicated.

Respiratory gymnastics, or artificial inflations of the lung, although of value in some cases, cannot be relied upon to produce a cure in all of these long-standing empyemas.

If an operation is indicated to close the abscess cavity, the

thoraco-plastic procedure advised by Schede should be employed. The multiple rib resection of Estlander should not be practised on these patients. The procedure is about as serious as is Schede's operation, and the reports of the cases treated by this method have not been as satisfactory as one would like. Schede's operation should be advised without hesitation in long-standing cases of tuberculous empyema, providing the patient's general condition is such as to suggest a favorable termination from the operation. The results from subjecting chronic tuberculous empyema to Schede's operation are sufficiently encouraging to advise this treatment in all cases in which pulmonary tuberculosis is not advanced.

In 1893 Fowler and Delorme advised decortication of the lung in the treatment of long-standing empyemas. The results from the reported cases that have been given this procedure are very favorable indeed. If in making the Schede operation portions of the pulmonary pleura present an appearance that would suggest unusual delay in healing, we should remove these areas by excision. The advantages of removal of the pleura to assist the expansion of the collapsed lung have no doubt been over-estimated. Of course it is possible that a cicatrized and thickened covering of the lung may prevent its expansion, but in most cases this does not interfere with the progress of resolution following an empyema. It has been shown by Grober, Castagne and others that adhesion of the parietal and visceral pleurae, producing traction on the lung, is perhaps the greatest factor in expanding the contracted lung. If this is the case, we are not warranted in removing the visceral pleura, with the idea of improving the lung's respiratory functions.

Tuberculous empyemas should be treated in the same manner as other chronic forms of the disease. The advantages of pulmonary compression on the tuberculous lung are not sufficient, in most instances, to allow us to leave the purulent collection in the pleural cavity. Occasionally a tuberculous empyema will not be productive of symptoms of such severity as to warrant operation. These cases are mere exceptions to the rule. If the tuberculous pleuritis has advanced to such a stage that suppuration has occurred, an operation will be beneficial to the patient even though a mixed infection is not present. Continuous aspiration in these cases seems to be inferior to rib resection and efficient drainage in the most dependent part. If a tuberculous empyema communicates with a bronchus, general anesthe-

sia or any operative procedure done with the patient in recumbent position should be avoided. Continuous aspiration, or intercostal incision, is all that we can safely advise under such circumstances. The incision, or a puncture, should be done with the patient sitting up. These cases are usually seriously ill and rarely live long enough to demand secondary or extensive operations to obliterate the pleural abscess cavity.

The indications for treating empyemas are by no means agreed upon by all authorities on this subject. The discussions at the Eighth Congress of General Medicine were sufficient to convince one of the veracity of this statement. While the majority of surgeons offer rib resection and drainage in the most dependent part as perhaps the best treatment for the greatest number of these cases, many men of large experience believe in widening the field for continuous aspiration and intercostal incision.

It is practically admitted by every one that the indications to be met in treating empyemas are: 1. To remove the pus; 2, to supply efficient drainage; 3, to assist in restoring the respiratory function, should this become necessary.

The first and second indications should be solved by rib resection and tubular drainage in the most dependent part of the abscess cavity. This should be done in all cases unless the condition of the patient is such as to contraindicate a general anesthesia, or the performance of any major operation. If this objection is present we should resort to aspiration or intercostal incision to give temporary relief.

The third indication, that is, assisting the compressed lung to expand, will rarely have to be met, if we advise operation promptly in all cases of empyema. The expansion of the lung in all probability is assisted greatly by the adhesions or granulations between the two layers of pleura. It is possible that as the drainage opening narrows the difference between the size of this opening and the bronchi of the collapsed lung may play some part in assisting pulmonary expansion. Aufrecht, Reineboth, Marten and Schiller believe that this is an important factor in producing rapid expansion of the lung. However, if natural forces, pulmonary gymnastics, and the air-pump aspiration of Perthes do not succeed in producing pulmonary expansion, operative measures are required, not with a hope of bettering the condition of the lung, but with the idea of obliterating the sup-

purulent cavity that continually inconveniences the patient and has no special effect upon his general health.

Senneker's procedure should be the operation of choice in treating non-standing empyemic cavities that refuse to heal. Although the operation is a serious one and cannot be undertaken unless the patient's general resistance is fairly good, the results following are sufficiently good to warrant us in performing it.

PLEURISY WITH EFFUSION.

The indications for thoracentesis in pleurisy with effusion depend upon the type of pleuritis that is present, the extent of the effusion, the severity of the pressure symptoms and the presence of a tuberculous involvement in the compressed lung.

Non-tuberculous pleurisy with extensive effusion is uncommon. Rosen, Vanilard, Eichorst, DeLamany and others are of the opinion that a non-tuberculous pleurisy that is subacute or chronic in character very rarely occurs. On the other hand, it is probable that non-tuberculous pleurisies with effusion do occur, and that some of these cases may last for a considerable period of time. Dieulafoy, Netter, Brown, Achard and others are firm believers in the occurrence of a chronic non-tuberculous pleurisy with effusion. Although, as has been shown, the majority of chronic pleurisies are tuberculous, in all probability non-tuberculous chronic forms do occur. Aspiration in these cases should not be resorted to during the early stages of the disease, unless pressure symptoms demand it. If the disease has continued for two or three weeks and the fluid shows no tendency to disappear, we should follow the advice of Kidd, and resort to aspiration if a quantity of the fluid is present in large quantities. If during the course of these cases the pressure symptoms from the effusion seriously inconvenience the patient, aspiration should be done at once if the fluid fills the entire pleural cavity, or extends as high as the second rib, it is usually wise to resort to aspiration. The effusion should also be removed if it is so situated as to produce considerable displacement of the heart. There is no serious objection to resorting to aspiration in these cases. If the fluid does not show a tendency to disappear spontaneously we are justified in removing it, especially when it is present in considerable quantity, and if pressure symptoms exist.

Although most authorities are in accord with the foregoing, there

is some dissention regarding the advice of aspirating in pleurisy with effusion. Nothnagel, of Vienna, and Nammaek, in this country, strongly oppose aspiration in pleurisy with effusion, unless it is absolutely demanded on account of asphyxia from pressure, or from serious symptoms that can be explained by the mechanical presence of the fluid. On the other hand, Furbinger, of Berlin, insists that not only is there no danger attached to withdrawing pleural effusion but that it is positively indicated in all cases, even if the quantity of effusion is small and produces no discomfort to the patient. These radical statements show the difference of opinion regarding the treatment that should be instituted in pleurisy with effusion.

Although aspiration is the generally accepted treatment in suitable cases, other procedures have been recommended and put into practice. Levaschoff and Tanfileiff have practised successfully replacement of the pleural effusion with normal salt solution. There is also the method advocated by Kawahara, which consists of air lavage of the pleural cavity after paracentesis, and that of Bernard, of replacing the pleuritic effusion with gelatinized serum. It is possible that the method of Bernard may be of considerable value in cases of hemorrhage into the pleural cavity, but it is doubtful if it will ever become a standard treatment in ordinary pleurisies with effusion.

Tuberculous pleuritis with effusion, without the presence of tuberculous changes in the lung, are of infrequent occurrence but they undoubtedly are occasionally met with. Eugene Hodenpyl in a series of one hundred and thirty-one examinations on adults found that tuberculous involvement of the pleura, without tubercular disease of the lung, was of frequent occurrence. A tuberculous pleuritis with effusion, without active tuberculous change in the lung, should receive the same treatment, from the standpoint of aspiration, as the non-tuberculous pleurisies with effusion.

A tuberculous pleurisy, associated with active tuberculous changes in the lung, is very common. A majority of the chronic pleurisies with effusion are secondary to pulmonary tuberculous changes. It is a much discussed question when aspiration should be employed in treating these cases, or whether it should be done at all. As a rule aspiration is advised in these cases if the effusion is large, or produces serious pressure symptoms. The advantage of leaving the pleural effusion in place is that the compression of the lung is supposed to have a salutary effect on the tuberculous change. Pulmonary

compression with nitrogen, as advised and practised by Murphy, accomplishes the same result as would a pleural effusion, producing compression of the tuberculous lung. Recent observations of M. E. DeCisternes and M. Sabourin, of Paris, go to show that pleurisy with effusion is of great benefit to the lung changes so commonly found in these patients. These writers report six cases that received great benefit from the presence of the effusion. They discuss the rationale of the means of the cure. Their clinical experience, associated with observations of pulmonary compression from other cases, show that we should hesitate to remove the pleuritic effusion in cases of pulmonary tuberculosis, unless serious compression symptoms positively demand it. If the effusion produces no serious compression symptoms, and is not likely to become suppurative, there can be little harm done in allowing it to remain. If its presence in any way contributes to a satisfactory termination of the pulmonary lesions, the patient should receive the benefit of that chance if he can do so without seriously endangering his life.

Although thoracentesis is usually considered to be a procedure without danger accidents occur frequently enough to warn us of the possibilities attached to puncture of the pleural cavity. Of course, in the great majority of cases thoracic aspiration is accompanied by no unpleasant symptoms, but when unpleasant symptoms do happen they are usually of a serious character. H. Ortnier has discussed in detail the complications that occasionally occur during thoracentesis. These are so well known that I will not dwell upon them.

PERICARDITIS.

Serous effusions into the pericardial cavity rarely require removal. In the great majority of these cases the fluid disappears spontaneously, and its presence in the pericardial sac for a considerable period of time does not result in permanent changes that demand the removal of the fluid. This is especially true when the effusion has a rheumatic origin.

It occasionally happens that a pericardial effusion becomes so large that it interferes seriously with the action of the heart. If it can be determined, from the size of the pericardial sac, the character of the pulse beat, and the dyspnoea, that a pericardial effusion is producing serious symptoms, aspiration should be done at once. In-

tercostal incision or rib resection are not necessary in removing non-suppurative collections from the pericardial cavity.

There is a difference of opinion regarding the advisability of removing non-purulent pericardial effusions. Norburg says that aspiration should not be resorted to until marked dyspnea, serious interference with the heart's action, and cyanosis make removal of the fluid imperative. Brentano advises the removal of pericardial effusions as soon as they are recognized—even if the amount of fluid is small. He says that aspiration, in these cases, is also dangerous and does not completely remove the fluid. He also condemns intercostal incision for the reason that it is not efficient in all cases, and is not infrequently a dangerous procedure, on account of the injury that might be done to the pleura and internal mammary artery. Brentano is of the opinion that rib resection and incision of the pericardial sac should be employed in treating most cases of pericarditis with serous effusion. These radical statements do not seem to be based on facts and clinical observations convincing enough to warrant following. When aspiration is indicated to relieve pressure symptoms due to pericardial effusions, the procedure should not be delayed until the patient is in as serious a condition as Norburg describes. The operation should be performed when the pressure symptoms are well marked and are progressing. If it becomes necessary to remove pericardial effusions, aspiration is all that is indicated unless pus is present. Although aspiration is not without danger in some cases, it should not be replaced by rib resection in non-suppurative cases.

Tuberculous serous pericarditis associated with well-marked tuberculosis of the lungs is an uncommon condition, but demands the same treatment regarding the removal of the exudate as has been advised for the non-tuberculous cases. Rendu aspirated the pericardial cavity in a patient who was suffering from advanced pulmonary tuberculosis associated with extensive pericardial effusion. The patient was in a very serious condition at the time the aspiration was done, and did not show decided signs of improvement until three days later. From this time the cardiac symptoms gradually disappeared.

SUPPURATIVE PERICARDITIS.

The presence of pus in the pericardial sac is a positive demand for operative interference. These purulent collections should be

drained as soon as they are recognized. If the patient's vital state is not so serious as to contraindicate general anesthesia, rib resection and drainage should be resorted to as the primary treatment. If the collection of pus is large, and the general condition of the patient critical, a portion of the pus should be removed by aspiration, as preparatory treatment for radical drainage. If the symptoms show no material improvement after the pus has been aspirated, intercostal incision, under local anesthesia, should be done in preference to rib resection, which usually requires general anesthesia for its performance. Intercostal drainage may be all that is necessary to secure a permanent result in some cases. It cannot be relied upon, however, to do this, and should never be substituted for rib resection and more efficient drainage unless on account of the serious general condition of the patient.

Removal of the pus by aspiration for the purpose of preparing the patient for radical drainage, is of great value in many instances. Although this procedure is not without danger—as has been shown by Cooper and others—it is sufficiently safe in most cases, and gives enough temporary relief to warrant its frequent use in preparing these patients to stand general anesthesia and the radical operation.

XXI. THE LARYNX, TRACHEA AND BRONCHI.

Acute obstructions of the larynx at times demand operative treatment. Acute inflammatory swelling, edema or injuries may obstruct the air passages to such a degree as to necessitate immediate operation to prevent asphyxia. When the seat of the obstruction is limited to the larynx, intubation is indicated in preference to tracheotomy, and should, as a rule, be attempted before a cutting operation is done. The indications and technique of the operative procedures done for the relief of acute obstruction of the air passages have been repeatedly discussed and are well understood.

FOREIGN BODIES IN THE TRACHEA AND BRONCHI.

Foreign bodies in the air passages can usually be removed without resorting to a cutting operation. The instruments of Killan are particularly useful in this line of work. It has been shown that many times foreign bodies can be removed successfully, unless they are lodged deep in the lungs, by using a bronchoscope. Killan makes the statement that we are justified in pressing the bronchi into the median line and bringing the larger bronchus and branch into one straight line. The reports of the cases treated by this method suggest that in the future open incision will be less frequently performed in removing foreign bodies from the trachea and bronchi.

Tracheotomy may or may not be required in the removal of foreign bodies from the air passages. An attempt at locating the body should be made before a tracheotomy is done. The use of a general anesthetic will depend upon the location of the foreign body and the type of patient under attention.

TUMORS.

Benign growths of the larynx should be removed when they interfere with respiration, inconvenience the action of the vocal cords, or are responsible for inflammatory conditions in the larynx. The technique of the operation for removing these growths depends, of course, on their size and location. Removal through the mouth is the method of choice for dealing with most benign, laryngeal growths; but thyrotomy or laryngotomy is indicated if the size or location of

the growth is such as to suggest that operation through the mouth will be extremely difficult.

In cases of chronic obstruction of the trachea, the existence of benign, intra-tracheal tumors and misplaced thyroid remnants must always be considered. These growths occasionally narrow the lumen of the trachea. Their removal should be attempted through a tracheotomy wound.

CARCINOMA OF THE LARYNX.

Although at the present time the existence of a carcinoma in any portion of the body is considered a disease amenable only to surgical treatment, this view is not altogether tenable in all cases of carcinoma of the larynx. It is true that all of these cases at their beginning, or in certain stages of their development, present positive indications for operative treatment, but it is equally the fact that this disease, under certain conditions, and occurring in certain patients, is perhaps best treated by palliative measures only. On account of the difference of opinion of good men regarding the advisability of surgical operations in certain cases of cancer of the larynx, and on account of the different radical views expressed by many men of experience with respect to the operation that is most useful in dealing with this condition in some of its stages, no attempt will be made here to enter into the various radical opinions that have been set forth, or to discuss in detail the various advantages of certain operations in certain stages of this disease. An attempt will be made to give in a brief and lucid manner what seems to be the generally accepted opinion regarding the treatment of carcinoma of the larynx to-day.

In order to review fully and in a brief manner the indications for operative treatment for cancer of the larynx, certain anatomical and pathological facts must be taken into consideration. Carcinomas of the larynx are perhaps best classified into the intrinsic and extrinsic varieties. According to Kreshaber, of Paris, the intrinsic tumors are those that originate from the vocal cords, the ventricles of Morgagni, the ventricular bands and the subglottic cavity, while the extrinsic varieties originate from the epiglottis, from the posterior surface of the cricoid plate, the aryteno-epiglottic folds, or the interarytenoid folds. This classification is based, not so much on the appearance and location of the growth as on the variety of tumor. The lymphatic

supply of the structures is of importance, not only from the standpoint of diagnosis but also from the indications for operative treatment. It has been observed clinically that the extrinsic cancers of the larynx are rapid in growth, that they do not produce distressing early symptoms, that a wide pathologic involvement is present before the patient complains severely, and for these reasons operative treatment is of little avail. The operation that relieves these patients is extremely serious and recurrence is the rule. On the other hand, intrinsic carcinomas of the larynx are usually unilateral in development. Their blood supply is not great and for this reason they are slow-growing at the beginning. On account of their anatomical location they interfere early with the functions of the larynx and on this account are capable of being recognized at almost the beginning stages.

Because of the arrangement of the lymphatics in the interior of the larynx, regional involvement occurs late in these growths. For this reason, intrinsic carcinoma of the larynx is amenable to early, successful operative treatment if operated in the proper stage, as advised so strongly by Mr. Butlin. The operation is not serious from the standpoint of the patient; is not difficult to perform; does not markedly mutilate or destroy vital organs; and, for pathological reasons, stated in the foregoing, that have been borne out by an extensive clinical experience by Semon and others, produces permanent cures.

EXTRINSIC CARCINOMA.

Extrinsic carcinoma of the larynx presents, doubtless in all cases, either an indication for complete laryngectomy or palliative operative measures. On account of the fact that many times these cases are unobserved until the disease has well advanced, on account of their rapid growth, their extensive blood supply and numerous lymphatic connections, and for the reason that many times these patients are much lowered in vitality, radical operative treatment should be refused to no small number of them. Of course it is true that complete removal of the larynx offers the only hope of permanently curing these patients, but it is also true that many times the seriousness of the operation, the fact that the patient is so inconvenienced by its performance, and the possibilities of an early recurrence are so great that this operation should never be undertaken unless all of these factors, and oftentimes others, have been taken into considera-

tion and the patient consulted—after he has had explained to him the danger and inconvenience of the radical treatment—as to his wishes in the matter. A discussion of the mortality of laryngectomy, or a consideration of the successful ultimate results, is of little avail in this connection. It is sufficient to say that very few complete cures have been effected in cases of extrinsic carcinoma of the larynx. It is generally known, also, that complete removal of the larynx has been simplified and in itself is not a serious operation when done according to the best methods advised to-day. The point in the radical treatment in these cases is not so much the operation, or the results that have been obtained, as the fact that the patients are poor subjects for any operation, that they give up in submitting to this operation a part of their existence in the loss of voice, and that after they have submitted to these sacrifices they cannot be assured, with any degree of certainty, that they will live longer than they would if no radical treatment had been attempted.

The technique of complete removal of the larynx, having been modified, developed and changed many times during a number of years, is best carried out by preceding the radical operation by a tracheotomy. It is not necessary that this should always be done and many operators at the present time do not resort to a primary tracheotomy. The disadvantage of doing a preliminary tracheotomy is that the patient is subjected to two operations. In order to remove the larynx it is generally agreed that the patient should be placed in the Trendelenburg-Rose position. The superior laryngeal nerve should always be cocainized, regardless of the anesthesia that is employed. The pharynx and esophageal wounds should be sutured at the primary operation and it is considered good practice to-day to bring the cut end of the trachea into the cutaneous wound and hold it there with sutures. In performing total laryngectomy the regional lymphatics, on both sides, should be dissected. Of course there are many modifications of the operation as described and it is probable that many improvements will be made in the future. The question of these differences in technique is not of particular value and for this reason time will not be taken up with the advisability of carrying out or neglecting certain suggestions that have been offered.

If there is reason to believe that an extrinsic carcinoma has advanced to the stage that renders radical removal inadvisable, palliative operations should be suggested if the growth is producing in-

convenience to the patient. The ligation of both carotid arteries cannot be expected to cure a carcinoma of the larynx, and should be considered, in these rapidly growing and extensive affections, according to the reports made, only to temporarily arrest the progress of the disease.

Tracheotomy to relieve laryngeal stenosis in cases of carcinoma of the larynx will rarely be performed. The intrinsic varieties of the growth are amenable to surgical treatment, even after they have produced stenosis of the larynx, while the extrinsic may even progress to the stage that will terminate life before a palliative tracheotomy becomes necessary. If the case is of such character that a tracheotomy seems indicated this operation should be done without delay. Of course it can be expected to give only temporary relief.

INTRINSIC CARCINOMA OF THE LARYNX.

Intrinsic carcinoma of the larynx in almost all instances is amenable to radical operative treatment. This is true for the reason that on account of the anatomical location of the growth, and its blood and lymphatic associations, it remains local in character for a comparatively long period of time. On account of its producing a certain amount of inconvenience in the larynx early symptoms are complained of and an early diagnosis is many times possible. For these reasons, and owing to the fact that this growth remains unilateral in most instances until the disease is well advanced, it is possible for us to radically treat an intrinsic carcinoma of the larynx in a large percentage of cases.

While it is true that there are many different opinions touching the indications for operative treatment in cases of carcinoma of the larynx, it is generally agreed to-day that the advice of MacKenzie, to do complete laryngectomy in all cases of carcinoma of the larynx, is to be disregarded; and that we are never justified in attempting to remove a carcinomatous growth of the larynx through the mouth. On all other points there seems to be a difference of opinion.

At present the successful treatment of intrinsic carcinoma of the larynx depends on early diagnosis. If there is reason to believe from the appearance of the growth, or from the examination of the section removed through the mouth, and from symptoms or other findings in the case, that the growth is suspicious of malignancy, a thyrotomy should be performed at once. If the diagnosis is made

early the carcinoma, which in the majority of cases will be found to be unilateral in position, can be removed successfully through the thyrotomy opening. This operation is not a serious one to do, does not mutilate or seriously inconvenience the patient and, according to the reported cases of those who have practised this procedure most extensively, it is entirely sufficient in dealing with all early cases of intrinsic laryngeal carcinomas. This operation, in the hands of Butlin, has been a very satisfactory procedure. Sir Felix Semon reports eighty-five per cent. of permanent recoveries following this operation. These experiences, and similar ones that can be studied, clearly suggest that thyrotomy has, to a certain extent, been a neglected operation in the past, that it has a large field of usefulness and that it should be the operation in all cases of intrinsic carcinoma of the larynx in which a timely diagnosis is made. If a thyrotomy has been done, and on local inspection of the larynx the carcinoma is found to be extensive the growth can be removed, or a unilateral laryngectomy performed. This operation is not nearly so serious as complete laryngectomy and many times will be found efficient in carcinoma of the larynx. If complete or partial laryngectomy is done the regional lymphatic glands should be dissected.

The advanced cases of intrinsic carcinoma of the larynx do not differ materially in the indications for treatment from the extrinsic carcinomas of the larynx. While a radical operation may occasionally be indicated in treating these cases, I am of the opinion that if the disease has progressed to the stage that requires complete removal of the larynx, the general condition of the patient and the probability of an early recurrence will, in perhaps a majority of the cases, contraindicate the complete operation.

Our aim in these cases should not be to devise extensive and mutilating operations, or to reduce the mortality of complete removal of the larynx, but to insist upon the importance and the characteristics of the early symptoms of carcinoma of the larynx, so that practitioners will make a timely diagnosis. If this is done extensive operations upon the larynx will have no place in surgery.

XXII. THE MOUTH, THROAT AND ESOPHAGUS.

In reviewing the demands for operative treatment of pathological conditions in the region of the mouth, throat and esophagus, many affections are purposely omitted. Malignant growths, benign tumors, localized suppurations, affections of the lingual tonsils and other processes offer little interest from the standpoint of indications for surgical treatment. The nature of the treatment for these affections is well known, and a repetition of the generally accepted views would be of but little value.

FRACTURES OF THE LOWER JAW.

Operative treatment should be the exception and not the rule in dealing with any fracture of the lower jaw. Utilization of the upper jaw as a splint, or the application of one of the various mechanical devices, is preferable in these cases to primary bony fixation. In certain fractures of the lower jaw primary fixation may seem indicated. These cases occur infrequently. Direct, primary operative treatment should be almost never the treatment of choice in dealing with a recent fracture of the mandible. The apparatus devised by Matas for retaining a fractured jaw in position is probably the most effective mechanical appliance for treating these cases.

Infection is perhaps the most important complication in fractures of the jaw calling for operation. All of these fractures are compound, and for this reason osteomyelitis is a possibility. The existence of an osteomyelitis complicating a fracture of the jaw gives an indication for operation. The diseased focus should be exposed, dead tissue removed, drainage provided for and the fragments retained in position, either by direct fixation or by the use of mechanical appliances.

ANKYLOSIS OF THE JAW.

Ankylosis of the lower jaw is in all cases a positive indication for operative treatment. The variety of the ankylosis does not modify the indications for treatment. The cicatricial and the bony cases are best relieved by surgical measures. Although it is possible in many instances to secure good results when these cases are of long standing,

early operative treatment should be instituted whenever possible. If operation is done early in these cases the shock to the patient is less severe and the mechanical results are far better than when the condition has existed for a long time.

In studying the indications for operative treatment for ankylosis of the jaw due to cicatricial contraction, the classification of Verneuil is important. This author divides these cases into two classes: those in which the cicatricial involvement is anterior, and those in which the chief trouble that limits the motion of the jaw lies well back, internal or behind the ramus. In treating the anterior variety, plastic operations on the cheek and other soft structures are entirely sufficient to secure very satisfactory results. When the posterior variety is to be dealt with extensive and repeated operations are many times necessary to secure a movable lower jaw. Operations on the soft structures, that is, the removal of cicatricial tissue, followed by plastic operations to close the defect, will suffice in most instances. If the condition is of long standing operations on the bone itself may be necessary.

If it is found at the time the operation is performed that a functional result cannot be obtained without attacking the bone a unilateral excision of the head and neck of the condyle, as first practised by Humphrey, should be considered, or if the cicatricial tissue lies well behind the articulation the operation of Esmarch, or a modification of it, which consists of making the false joint anterior to the cicatricial tissue, should be done. In bilateral cases it is not necessary that the operation be divided into two stages, nor is it advisable, in most instances, to operate upon one side at a time. A bilateral excision, or the forming of a pseudoarthrosis, should never be done on both sides. The results following bilateral bony operations are not sufficiently good to warrant their accomplishment.

In cases of bony ankylosis of the lower jaw an operation limited to the joint cavities will, in most instances, be all that is necessary. Breaking up of the interarticular bony formations, followed by the placing of a band of fibrous tissue between the bony surfaces, can be carried out with success in not a few of these cases. If there is reason to believe, after examination of the joint has been made through incision, that an arthroplastic operation will not be sufficient to secure a satisfactory result, the operation of Esmarch, or a modifi-

ection of it, should be done on one side, but, as a rule, this procedure should not be performed on both condyles.

LUDWIG'S ANGINA.

This acute inflammatory process is best treated by early and extensive incision. We are not justified, in these cases, in deferring drainage until localized suppuration occurs. In most of these instances the infection begins in one of the submaxillary glands, and usually produces well marked changes within the gland before the infection spreads to the surrounding structures. A free incision should be made over the most prominent portion of the swelling, and an opening should be effected with a blunt instrument into the submaxillary gland corresponding to the side that was first involved in the inflammatory action.

RANULA.

The treatment of ranula is surgical. Aspiration, simple incision, or the use of a seton should be advised against in these cases. Such means cannot be relied upon to cure any cases of ranula. The treatment of choice should be removal of the anterior wall of the ranula, followed by curettement of the remaining portion of the cavity. Complete enucleation is more difficult to effect than the procedure recommended in the foregoing, and is not productive of more satisfactory results.

THE TONSILS.

Localized collections of pus in the structure of the tonsils, malignant growths or the presence of definite tumors, are positive indications for removal.

TONSILLITIS.

Acute and even repeated attacks of tonsillitis do not necessarily warrant removal of these glands. The same may be said of chronically enlarged and periodically inflamed tonsils. Many times these organs that have been the seat of repeated and serious attacks of inflammation gradually become painless and atrophied. Therefore their removal is not imperative.

A tonsil, or both tonsils, should be removed in cases in which the attacks of inflammation are repeated and severe and the organ remains enlarged and tender between the attacks. Tonsils should

also be removed if they are not large, but are found to be adherent to the anterior pillar of the fauces. I know of no exception to this statement. If peritonsillar suppurative inflammations occur in a patient who has had his tonsils removed care must be taken to determine that no tonsillar tissue remains hidden behind the anterior pillar of the fauces.

It is believed by some that we are right in removing tonsils that do not appear perfectly normal, with the idea of preventing infection of the body by the tubercle bacillus. The work of Semon, Kruckmann, Ruge, Myles and others seem to prove that the tonsils play an important part in the entry of tubercle bacilli into the body, and according to many observers we are entirely justified in removing the tonsils in order to prevent this infection. It would seem, however, that we are not called upon to remove the tonsils in an otherwise healthy child with the idea of preventing tuberculous infection. It has been the custom of some in operating upon tuberculous glands of the neck to precede or accompany such operation by removal of the tonsils. In almost every instance they have found in the tonsils evidence of a diseased condition, or the results of a previous inflammation.

The technique of removal of the tonsils has been described differently by different authors. It makes no difference which method is used if the entire tonsil is removed. The most important principle in these operations is to separate the tonsil from surrounding adhesions before its removal is attempted. The adhesions anterior to the tonsil can be separated with the finger, or by using a curved instrument. If this precaution is not attended to it is impossible to remove the entire gland and the portion that remains is the most important part from the standpoint of producing disease. No tonsillectomy should be considered complete unless that portion of the tonsil lying immediately behind the anterior pillar of the fauces has been completely enucleated.

RETROPHARYNGEAL ABSCESES.

Retropharyngeal collections of pus call for surgical treatment. If the infection is an acute one and the existence of tuberculosis can be excluded, the abscess cavity should be aspirated, and after most of the pus has been removed, a free incision should be made. Local or general anesthesia is, as a rule, contraindicated in operations upon

these cases. If it is advisable to incise the abscess without a preliminary aspiration of its contents the patient should be placed in the Rose position to prevent, if possible, the aspiration of purulent material into the lungs.

Tuberculous retropharyngeal abscesses should not be drained into the mouth. The abscesses are usually dependent upon bony disease, and for this reason secondary infection, which is the rule when these abscesses are drained into the mouth, should be avoided. These tuberculous abscesses should be drained through an external incision, and at the same time dead osseous tissue should be removed with a curette when it is found possible to do so.

FOREIGN BODIES IN THE ESOPHAGUS.

It is probable that a cutting operation will rarely be indicated to remove foreign bodies lodged in the esophagus. The work of Killan in esophagoscopy and bronchoscopy has shown that in almost every instance we should be able to remove ordinarily formed bodies by using his instruments. The results obtained by this method so far have been encouraging, and the reports of Coolidge, Ingals and others seem to prove that severe operative measures will rarely be required in removing foreign bodies from the esophagus.

It has been agreed, however, that if the foreign body is located from twenty-four to twenty-six centimeters below the upper incisors, deep gastrotomy or posterior mediastinotomy, as described by Enderlin, is indicated. In certain instances of lodgement of a foreign body in the upper portion of the esophagus low, lateral pharyngotomy may be demanded. An attempt should be made in nearly all of these cases to remove the foreign body without doing a cutting operation.

DIVERTICULA OF THE ESOPHAGUS.

In discussing the indications for surgical treatment in cases of diverticula of the esophagus we shall consider the lower portion of the pharynx and the upper portion of the esophagus under the same heading, as there is no real difference in these structures. A classification of diverticula of the esophagus, from the standpoint of treatment, will be based on the location of the lesion. Those of the pharynx, those at the pharyngo-esophageal junction, or the Grenz diverticula of Rosenthal, are the only ones that give indications for surgical treatment in all cases. The epibronchial diverticula of Lutgert and the deep-seated diverticula close to the cardia of the stom-

ach, rarely call for radical operative treatment. If operation becomes necessary to relieve this deep-seated diverticula, palliative measures only are possible. A discussion of the various diverticula according to their etiology or to classifications corresponding to those made by Rokitansky, Zenker and Ockonmoides, is of no value in estimating the indications for operative treatment and for this reason will not be considered.

Palliative operative measures for diverticula of the esophagus are usually unsatisfactory. The persistent use of sounds and stomach tubes in these cases, as followed by Berkans, Bruns and Schede with more or less success, can rarely be expected to permanently cure these conditions. The injection of strong chemicals into the diverticula, as practised by Dendy, should never be advised. It is uncertain and dangerous.

From the reported operated cases of diverticula situated in the upper portions of the esophagus we are justified in attempting a radical cure in quite all patients. The cases studied by Kluge, Bergmann, Veiel, Halstead and others, clearly prove that operative measures may many times be expected to be followed by permanent results if the operation is done in properly selected examples. Radical removal of the diverticulum should never be undertaken unless the sac is extremely large and cannot be invaginated. The operation of Girard, which consists of placing a purse-string suture around the neck of the diverticulum, followed by inverting the sac into the esophagus, should be the operation of choice. Fistula formation is not likely to occur, infection from the esophagus is practically impossible, and a permanent result may be expected in the majority of cases if this operation can be carried out. In performing this operation it is not necessary that the external wounds should be drained. On the other hand, if invagination is impossible, and it is necessary to remove the sac, the esophagus should be closed and temporary drainage at least provided for down to the esophageal opening.

Radical removal or invagination should not be attempted to relieve cases in which the diverticulum is situated deep in the thoracic cavity. In these cases gastrostomy may be indicated to feed the patient, but must be considered as a palliative measure only.

STRICTURE OF THE ESOPHAGUS.

Many of the common forms of stenosis of the esophagus present indications for radical or palliative surgical treatment. In the majority of instances cicatricial constriction of the esophagus can be treated successfully only by surgical measures and there exist positive indications for mechanical treatment. In dealing with malignant growths of the gullet only palliative measures are demanded in most cases. Of course, strictures of the esophagus resulting from the pressure of mediastinal tumors or aneurysms present no indications for operation and rarely can be benefited by gastrostomy.

Carcinomatous stenosis of the esophagus rarely calls for dilatation, and seldom is recognized until the obstruction is quite complete or practically impassible. The opinion is given that we are not justified in introducing tubes through these carcinomatous narrowings, and that our treatment should be palliative. It is probable that these patients will complain less and will live as long if a gastrostomy is done when the esophagus is occluded as they will if attempts are made to keep the esophageal lumen open after the growth is well advanced. It is possible that under certain conditions a carcinoma of the upper portion of the esophagus can be removed by surgical operation. As a rule these operations will not be undertaken. It is probable that complete removal of the growth can rarely, if ever, be accomplished, while the operation is difficult and by no means free from danger.

Cicatricial stenosis of the esophagus, resulting from the destruction done by the drinking of caustics or other corrosive substances, is probably the most commonly encountered form of esophageal obstruction. These cases offer positive indications for treatment. In the early stages dilatation from above may be sufficient to keep the opening in the diseased area from becoming markedly contracted. If the disease has advanced to a stage in which the esophageal opening is very small, or practically closed, an attempt should be made to introduce a thread or a filiform bougie through the contracted area. If this is unsuccessful a gastrostomy is required and an attempt should then be made, through the stomach, to pass the stricture. If it is impossible to find the opening in the stricture little can be done to relieve the patient. The gastrostomy must be permanent in order that nourishment can be given. If the attempts to pass the esophageal

stricture are successful, the indication is to gradually dilate or cut the stricture. Silk of various sizes should be pulled through and after a string composed of silk has been drawn through the stricture an attempt should be made to introduce a rubber tube. If the rubber tube can be passed through it will be quite efficient in dilating the narrowing in the esophagus. If these measures do not prove successful an attempt should be made to cut the stricture by sawing with a silk thread. If these methods are more or less successful a Barnes' dilator may be introduced. It is probable that if passage of the stricture is successful at all, the treatment, if carried out properly and persisted in, will result in marked improvement to the patient. If the attempts at dilatation have been successful to an extent that it is likely that the patient will be able to use the esophagus without difficulty, the gastrostomy opening should be allowed to close and the patient fed in the natural way.

In all of these cases it must be remembered that recurrence of the stricture is almost certain if treatment is not continued. Bougies should be passed frequently, and perhaps during the remainder of the patient's life, after primary dilatation has been successful. If this precaution is not observed many times the patient will not complain of symptoms until the stricture has again become very narrow, and if this is the case the difficult and prolonged treatment must again be gone through with.

Localized strictures of the esophagus, resulting from narrow annular constrictures, or from localized ulcerations, may sometimes be treated by direct incision. These operations are, to a certain extent, dangerous and should be resorted to only in exceptional cases. We should never do a cutting operation within the esophagus if gradual methods can be utilized to secure the desired results. In cases of benign stricture of the esophagus close to or at the cardiac end of the stomach, avulsion, through an abdominal incision, may occasionally be valuable. These cases are extremely rare, but if there is reason to believe, from the location of the stricture and from its extent, that it can be treated successfully through an abdominal incision, or through an opening into the stomach, divulsion or direct incision of the stricture should be considered and should be carried out if the conditions observed, after a laparotomy has been made, indicate this form of treatment.

XXIII. THE THYROID GLAND.

Suppurative inflammation of the thyroid gland is an uncommon condition. Should it exist, however, surgical interference is required. Incision and drainage should be done in all of these cases as soon as it can be determined that pus has formed. Multiple incision into the thyroid gland should not be advised in cases of suppurative thyroiditis unless it is clear that localized collections of pus are present. In all cases in which suppurative collections in the thyroid gland are drained, the opening in the glandular tissue itself should not be made with the knife, but the abscess should be opened by blunt dissection. Operations for collections of pus in the thyroid gland are usually satisfactory procedures. Severe hemorrhage has been known to occur after a thyroid abscess has been opened, but these bleedings are usually easily controlled by packing.

TUBERCULOSIS.

Tuberculosis of the thyroid gland, though of rare occurrence, has been observed. The cases are too few to warrant any statement regarding the advisability of surgical treatment. If the tuberculous process results in the formation of localized collections of pus, drainage would be indicated. It is improbable that a non-suppurative tuberculosis of the thyroid gland will call for surgical treatment.

ECHINOCOCCUS CYSTS.

Echinococcus disease of the thyroid gland has been known to occur. The presence of an echinococcus cyst in the thyroid gland gives a positive indication for drainage. A few of these cases are recorded that have been treated successfully by incision, evacuation and prolonged drainage.

BENIGN TUMORS.

Benign tumors of the thyroid gland must be treated surgically if they produce severe symptoms from their mechanical effects, if they result in serious deformity, if they are rapidly increasing in size, if they show a tendency to develop into malignant growths, or if they produce obstructive or pressure symptoms; non-operative treatment is of no value in these cases. If the condition is severe enough to warrant treatment of any kind, operative intervention is the only

measure that will yield good results. Many of these tumors are adenomatous in character and are best treated by enucleation or partial resection of the gland. Operative procedures for benign growths involving the thyroid are usually very satisfactory. The operation is not an unusually dangerous one and recurrences are not to be expected.

MALIGNANT GROWTHS.

Sarcomas and carcinomas occasionally occur in the thyroid gland. These tumors present a serious consideration, both from the standpoint of the patient and the advisability of subjecting them to operation. Sarcoma of the thyroid gland may be of a slow-growing character, and many times calls for removal. On the other hand cancers of the thyroid are of rapid growth and terminate the patient's life in a short time. Orrel has stated that a cancer of the thyroid will usually end the life of the patient in six months. On account of the difficulties of removing cancers involving the thyroid, on account of the extensive involvement of the surrounding tissues that may be expected to occur early in these cases, and on account of the frequency of recurrence following radical operations for this disease, it is probable that there is little to be gained by radical removal of the growth. Simmonds and many others think that it is unadvisable to attempt radical treatment in these cases. Although it may be true that in the great majority of cases very little can be expected in the way of producing permanent cures by subjecting cancers of the thyroid gland to operative treatment, an occasional recovery may be expected if the growth is attacked at the proper time. No other procedure or method of treatment offers the slightest hope for the patient, and if he succumbs to the radical operation, or an early recurrence follows the removal of the tumor, no great amount of harm has been done. Occasionally a cure will doubtless be effected if these cases are granted an early operation. Barker removed a slow-growing carcinoma of the thyroid and two years later was obliged to operate again for a recurrence; the patient then remained well for a period of two years, at which time no evidences of a return were present. It is generally admitted that early operation affords the only chance of giving these patients relief. On account of the rapid growth of the tumor it rarely happens that a patient presents himself for treatment when the disease is in its early stages. It is impossible to say that certain signs

and symptoms are positive in favor of operation, or give dependable information regarding the extent of the growth. If from the examination and the duration of the symptoms there is reason to believe that the tumor is confined within the capsule of the gland, radical removal should be attempted. If it can be determined that the growth, in all probability, has extended beyond the glandular capsule, it is usually unwise to operate. Recurrences may be expected in all of these cases.

In advanced cases of cancer of the thyroid gland palliative operations may be necessary to prolong the life of the patient. These procedures are very unsatisfactory. A tracheotomy does not always relieve the dyspnoea, and cannot be relied upon to prolong the patient's life beyond a few weeks. Partial, or complete, removal of the gland may give relief from pain in certain advanced cases.

GOITRE.

It rarely happens that operative treatment is required for the relief of simple enlargements of the thyroid gland. Although the local treatment for goitre is to a certain extent uncertain, and occasionally symptoms resulting from the condition are serious, we are not justified in advising surgical treatment as a routine practice in these cases. Local treatment should be given a fair and prolonged trial in all these patients. If it has been decided upon that an operation is to be performed, partial removal of the gland is held to be the only operative procedure that should be considered. Exposure of the gland and ligation of the thyroid arteries should have no place in the treatment of goitre, as these are not as safe as partial removal of the gland and the results are, as a rule, unsatisfactory. Injection of chemicals into an enlarged thyroid gland is a procedure that, it is believed, should be discarded. It is generally admitted that the injection treatment is not without danger in certain cases, and that its results are uncertain in character and by no means constant. Many, perhaps, will object to the statement condemning the injection treatment, for it is undoubtedly true that good results have been brought about by this method. Although many operators will continue to inject carbolic acid, iodine and ferric chloride into enlarged thyroid glands, this treatment will be less popular in the future than it has been in the past. Partial removal of the gland will, it promises, replace all operative methods for simple enlargements of the thyroid. The procedure, if properly

done, removing the lobe from the isthmus to the outer side instead of attacking the gland from without inwards, is not serious and is productive of good results in most instances.

Although partial removal of the gland is a comparatively safe and efficient method of treating goitre, this operation should not be advised unless the indications for it are decided. The great majority of simple goitres will not require operative treatment. Although it is impossible to lay down definite rules for or against surgical interference in cases of simple goitre, the advice of Kocher in this regard voices, fairly well, the indications for treating goitre. Kocher believes that as soon as simple goitre becomes dangerous, that is, when it produces attacks of dyspnoea, is the seat of an inflammatory process, or shows evidences of malignant disease, it should be subjected to operative treatment at once. He is also of the opinion that all enlarged goitres that have a tendency to extend into the thoracic cavity should have operative treatment. It is usually useless to expect complete relief by medical or electrical treatment if a goitre is nodular, or shows marked irregularities on the surface. A positive indication for immediate treatment is given when a patient who has a simple goitre gives evidences of exophthalmic symptoms, or is a subject of marked nervous changes, or tachycardia. It is usually advisable to operate on a goitre that resists medical treatment, if it is rapidly increasing in size. This is true in young as well as in middle-aged patients.

If a patient has a very large goitre that produces obstruction or pressure symptoms, palliative operative procedures may be done to advantage if the general condition of the patient is such as to contraindicate partial removal of the gland. Division of the thyroid isthmus, or even tracheotomy, may be demanded to give these patients temporary relief.

EXOPHTHALMIC GOITRE.

Surgical treatment offers about the only hope of permanent relief for severe cases of exophthalmic goitre. Many of them improve under various medicinal and local treatments, and occasionally marked improvement is noted without any treatment at all, but in the great majority of instances no substantial relief is obtained unless surgical measures are resorted to. The medical treatment of exophthalmic goitre is admitted by all to be uncertain and productive of inconstant results. It is to be hoped that the serum treatment of this disease,

recommended and used by Moebius in 1901, and by Murray in 1904, will prove to be more beneficial than the other non-radical methods have been shown to be.

The surgical treatment of exophthalmic goitre is by no means entirely satisfactory. The operation is a dangerous one and cannot be expected to give relief in every case. The reports of Booth, which show a mortality of ten per cent., fairly represent the severity of this operation, as do the reports of Starr, who in 1896 recorded one hundred and ninety cases, giving a mortality of twelve per cent. The results of Kennicut and Kocher are more satisfactory. The late report of Schulz shows twenty-one operated cases without a death. The reports of a small number of cases, operated upon by several surgeons, are of little value in determining the true severity of operations for this disease.

The results following surgical treatment for exophthalmic goitre are not as encouraging as one would expect if the treatment as advised and practised today by most operators positively meets the pathological indications of the disease. The reports of Witherspoon, showing sixty per cent. of cures and fifteen per cent. of marked improvements, fairly represents the results that may be expected from operative treatment. Kocher reports seventy-six per cent. of his cases as being cured. Wilmer, Rembach and Mikulicz report eighty-one per cent. of cures in a large number of cases collected.

Although, as has been shown by the mortality of the operation and the results obtained, the surgical treatment of exophthalmic goitre is unsatisfactory it offers the best method we have today for giving these patients relief. Sclerosis of the gland and its lymphatic connections, that has been seen to result from Roentgen ray exposures, is too uncertain in character to replace the operative treatment at the present time.

The results of the tabulated cases of exophthalmic goitre that have been treated surgically are less encouraging than they would be if a proper selection of the cases had been made previous to the performance of the operation, and if all of the operations had been done by men with a large experience in thyroid surgery. The statement may be made that partial removal of the thyroid gland, if done early in the disease and if done quickly and according to the best technique, will be found to be a fairly efficient method of dealing with this disease.

These patients should not be operated if the disease has advanced, if edema has been present for some time, or if the nervous symptoms are very pronounced. It is unwise to subject any of these patients to operative treatment if the pulse rate is from 130 to 160 per minute, or if the nervous or cardiac symptoms are given to marked and sudden variations. If the disease has progressed to a stage where these symptoms are present, it offers a very poor operative risk. Although it may be advisable in most instances to recommend early operative treatment, it should not be understood that surgical treatment is the thing for all cases of exophthalmic goitre. Many times these patients improve remarkably under simple care and remain in good condition for a long period of time; again the symptoms seem to abate under treatment and the patient is comparatively comfortable for the remainder of his life. Every case of exophthalmic goitre should be given non-operative treatment, although, as we have stated before, this method is uncertain and its results by no means constant, before advising surgical means. There are, however, certain cases that offer an exception to this statement concerning medical treatment. A thyroid gland that is large, that has grown rapidly, and produces acute and alarming symptoms, may be expected to progress rapidly and little can be done to relieve the symptoms in these cases. If the gland is well-developed and the symptoms acute and severe a fatal termination may be expected in a short time unless operative treatment is utilized.

The Operation of Choice. The opinion is held that there are only two operative procedures that deserve consideration in the treatment of exophthalmic goitre at the present time. I refer to partial removal of the gland and to operations on the sympathetic cervical ganglia.

Ligation of the thyroid arteries, advocated by Kocher, Woeffler, Rehn, Trendelenburg, Rydygier and others, has proven to be as serious a procedure as partial removal of the gland, and is not productive of as good results. It is seldom employed today. Exothyreopexy, advised by Jaboulay, is not to be recommended at the present time. The future course of these patients is dubious and unsatisfactory, and the results obtained by the operation are uncertain.

Partial excision of both lobes, recommended by Socin, does not offer more chance of relief than partial removal of the gland, and is a very serious and bloody operation to perform. It should not be advised in the treatment of exophthalmic goitre.

Partial removal of the gland has proven to be a fairly satisfactory method for treating exophthalmic goitre. The results of the cases operated upon, concerning the seriousness of the procedure and the benefits derived from it, are not of great value in determining the exact status of the operation. Doubtless many failures have not been recorded, and it is equally true that many of the good results have been over-estimated; on the other hand it is probable that many of these operations were injudiciously, if not incorrectly, executed, and it is to be expected that in not a few of the early cases post-operative infection played an important part in the permanent result.

It is believed that partial removal of the thyroid is the most efficient treatment that we have today for exophthalmic goitre. This view is held by a large number of experienced operators, although many dissent from it.

Today there are not a few who advocate and practise removal of the cervical sympathetic ganglia for patients suffering with exophthalmic goitre. This operation was first done for epilepsy, in 1889, by Alexander, of Scotland. In 1893 it was proposed for the relief of exophthalmic goitre by Barocz. The first operation that was performed for the relief of exophthalmic goitre was in 1896 by Jonnesco, and since that time many operators have advised and followed out removal of the cervical sympathetic ganglia for the relief of exophthalmic goitre. The benefits obtained by this method are quite satisfactory in some cases. The mortality does not seem more than that following partial removal of the gland, and the results are nearly as good. There are many who claim that this is the proper treatment for exophthalmic goitre, and that it should replace removal of the gland in all cases. Those, however, who have given the subject more study and perhaps who have had larger experience in dealing with this condition, prefer removal of the gland to operations on the sympathetic. At the present time it is impossible to say that one operation should be done in preference to all others.

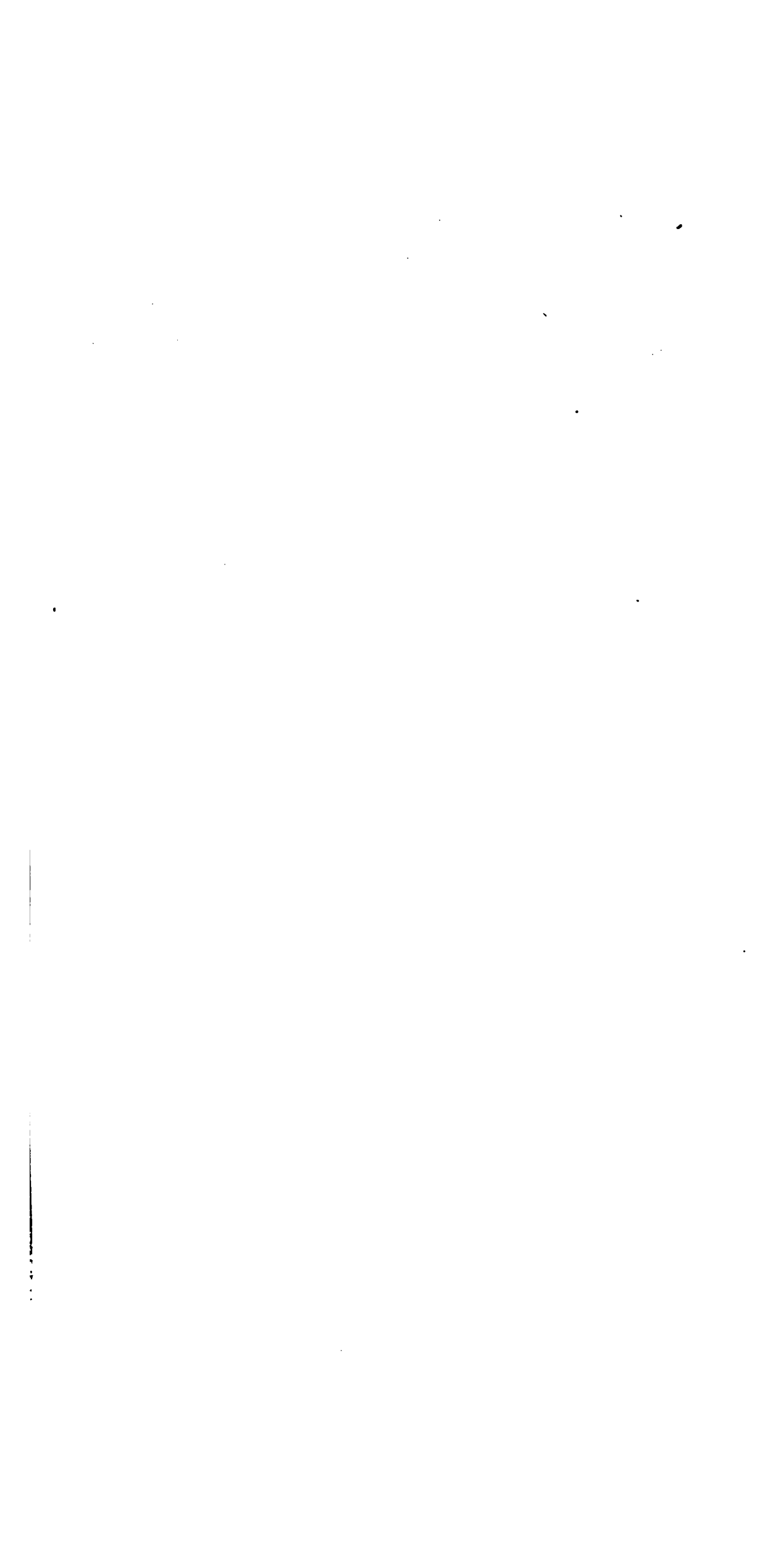
Although the pathology of exophthalmic goitre is comparatively well known, the relation of the nervous system to the excessive thyroid secretion has not been determined. It is generally agreed that the symptoms of exophthalmic goitre are due to products that are elaborated in the thyroid gland, or in the para-thyroids, but it is not known that the changes that are responsible for this undue activity or modified secretion are situated in the gland itself, or are the result

of primary lesions in the nervous tissue. It has been shown by Exner and by Edmonds that lesions in the sympathetic nerves are capable of not only producing hyperactivity of the thyroid gland, but may produce an atrophy, or even a complete inactivity of the organ. It was pointed out that removal of the nerves that supply the gland produces results not unlike those following removal of the thyroid, and that thyroid feeding was incapable of causing eye symptoms if the sympathetic ganglia had been removed. In one set of experiments the nerves were operated upon on one side only and excessive thyroid feeding resorted to; symptoms of hyperthyroidization occurred in the eye opposite to the side that was operated, while the eye on the operated side presented no exophthalmus or other symptoms of thyroid over-feeding. These experiments seem to show that the nervous system can control to a great extent the secretion of the thyroid gland.

This showing of Exner and Edmonds does not settle the question of the primary and most important lesions in exophthalmic goitre and on this decision depends the rational operative treatment for the disease. If the primary change is in the medulla, or in the sympathetic nerves, operations not attacking the gland itself would be indicated; if, on the other hand, the primary change is in the secreting structures of the gland itself, and the relief from symptoms that follow operations on the sympathetic nerves depends upon modifying the activity of the gland and preventing the occurrence of certain symptoms, it is probable that direct removal of a portion of the gland would be the more satisfactory method of treatment. So long as an explanation of these points cannot be had, we are unable to say positively what the proper treatment for exophthalmic goitre should be. The pathological findings seem to point to the thyroid gland, or to the para-thyroids, as being responsible for the changes productive of the train of symptoms known as exophthalmic goitre. In all of these cases the gland presents marked evidences of hyper-activity even if there is little, or, as some have claimed, no enlargement of the thyroid gland there always occurs, so far as I am able to determine, marked evidences of undue activity in the organ.

On the other hand no one has determined positively that constant changes may be expected in the medulla or other nervous tissues in cases of exophthalmic goitre. The cases described by Curtis and Wood show that certain slight changes were present in most of the ganglia in those they examined. The changes that have been observed in the

medulla in cases of exophthalmic goitre are not more constant or significant than those described by Woods as occurring in the ganglia. It seems to me that the preponderance of evidence demonstrates that the thyroid gland is in all probability responsible for the symptoms of exophthalmic goitre. The changes in the gland are constant and are of a certain type in every case. On the contrary the changes in the sympathetic nerves and medulla are by no means constant; their character is uncertain, and their significance unknown.



XXIV. THE LYMPHATIC SYSTEM.

Although the lymphatic system is of extreme importance in relation to operative surgery and surgical disease, the indications for treating diseases involving the lymphatic system are quite definite and are generally well understood. For these reasons injuries to the lymphatic system, tumors originating in, or involving, the lymphatic structures, lymphedema, and elephantiasis will not be taken up.

A consideration of the lymphatic system is of importance in undertaking surgical operations, from the standpoint of dissemination of disease. This is particularly true in draining infective material through healthy tissues. In performing operations of this character, it is important to seal as completely as possible the divided lymphatics before the wound is contaminated. The incision should extend to but not into, the infected structures, then the wound should be coated with vaseline, or preferably compound tincture of benzoin, before collections of pus are liberated or diseased tissue attacked. These simple precautions many times prevent dissemination of infection, and as a rule markedly diminish post-operative suffering and shorten convalescence.

ACUTE LYMPHANGITIS.

Acute lymphangitis in itself never affords an indication for operative treatment. Acute infections of the lymphatic vessels are usually secondary, and suggest that the primary focus of disease is not draining efficiently. In these cases the indication is to secure requisite drainage of the primary diseased focus. Multiple incisions do no good in dealing with septic lymphangitis.

ACUTE LYMPHADENITIS.

Operative treatment is called for in cases of acute lymphadenitis only when suppuration has occurred. We should never incise or remove acutely inflamed lymphatic glands before pus has formed. When suppuration occurs simple incision of intra-glandular and periglandular purulent collections meets the indications. It is unwise as a rule to remove acute, suppurating lymph glands. I believe that curettement in these cases should be advised against. It seems that convalescence is prolonged, rather than shortened, by the use of the curette in suppurating glands.

CHRONIC SEPTIC LYMPHADENITIS.

Chronically inflamed glands that remain permanently enlarged, that continually inconvenience the patient, or are associated with periglandular inflammation, or are subject to acute and repeated inflammatory exacerbations, should be removed. This operation should be executed without delay if the primary lesion responsible for the adenitis has undergone resolution. If the primary affection is still active, this should receive attention before the chronically inflamed glands are removed.

SYPHILITIC LYMPHADENITIS.

Syphilitic lymphatic glands require removal only when complicated with mixed infection. It has been my experience that non-suppurating syphilitic glands offer little resistance to the ordinary infections. They suppurate readily and resolve slowly, or, in most instances, refuse to undergo resolution. Chronically inflamed lymph glands, depending upon a primary syphilitic involvement, complicated with a secondary mixed infection, present, in most instances, an indication for operative removal of the diseased lymphatic structures.

TUBERCULAR ADENITIS.

In considering the indications for operative treatment of tubercular adenitis the facts must never be lost sight of that this condition is usually secondary; that extensive active or latent tuberculous changes are frequently present in other portions of the body; and that tubercular glands should never be removed if it is impossible to deal efficiently with the infection atriium.

Primary tuberculosis of the lymphatic glands rarely, if ever, occurs. It is true that the infection atriium may have become normal and for this reason makes the glandular disease appear as a primary infection. When such a condition is present the glands may be dealt with as if they were the primary seat of the disease.

Tuberculous adenitis offers an indication for operative treatment if extensive tuberculosis is not present in other portions of the body. The presence of marked, and sometimes active, pulmonary or peritoneal tuberculosis does not always contraindicate operative treatment for tubercular adenitis. This is especially true if the glands are broken down or are complicated with mixed infection.

Tubercular glands should never be removed if it is impossible to

treat satisfactorily the site of entrance of the infection. Lesions in the throat, mouth, nose, and other portions of the body that offer a chance for infection to reach lymphatic glands must always have attention either before or at the time the glands are removed. If these primary sources of infection are not attended to, and the regional lymphatic glands are removed, the patient is deprived of the means of preventing general dissemination of tubercular infection and is injured, rather than benefited, by an adenectomy.

In all operations for tubercular glands it is more important that the occurrence of infection should be prevented than that the secondarily diseased glands should be removed. Tonsils, adenoids or other growths, and inflamed and ulcerated areas should be given careful consideration before regional tubercular glands are removed.

The extensiveness of the local glandular tuberculosis may or may not be an indication for removal. The presence of many glands that seem to be progressing in development constitutes an indication for removal. Small or moderate-sized but freely movable tubercular glands occurring in children may not require surgical treatment. Many times these glands undergo resolution after diseased tonsils, or other abnormal structures, have been properly dealt with.

The occurrence of suppuration in a tubercular gland usually presents an indication for operative treatment. Most of these cases are complicated with mixed infection, and gradually progress in severity, if not treated by operative measures. If these abscesses are large, and considerable intoxication seems present, incision and drainage are called for at the primary operation. After the local and general symptoms have improved adenectomy should be done.

The presence of discharging sinuses leading to tubercular glandular infection gives an indication for operative treatment. While it is true that occasionally curettement and the application of chemicals may succeed in curing these patients, a dissection of the diseased area, with removal of the lymphatic glands, will usually be the treatment of choice.

If it has been decided to operate in order to remove tubercular glands the operation must be thorough to be successful. The infected region must be completely exposed and all suspicious glands removed.

Unilateral cervical glandular tuberculosis usually requires a complete unilateral dissection from the styloid process to the subclavian vein. It occasionally happens that a submaxillary tuberculosis can

be efficiently treated by limiting the operation to the submaxillary triangle. If, however, enlarged glands can be palpated in the region of the bifurcation of the carotid, anything short of a complete unilateral dissection may be expected to be followed by a recurrence.

The removal of tubercular glands through a posterior incision and without direct inspection of the operative field, such as has been practised and recommended by Dollinger, seems to be both an unsafe and an unwise procedure. The danger and the inefficiency of this method, in certain cases, are obvious.

It is usually a wise procedure to provide for temporary drainage after removal of tubercular glands—especially after extensive dissection of the cervical region.

XXV. THE VASCULAR SYSTEM.

WOUNDS OF THE ARTERIES.

A wound of an artery sufficiently large to produce severe hemorrhage should be treated surgically. There is no question regarding the indications to be met in wounds of the smaller vessels in which the vessel can be ligated without danger, and in which the ligation of the vessels does not produce anemic necrosis. There is also no dispute regarding the severity of lesions involving the largest arteries of the body. Wounds of the aorta and innominate are so serious that they admit of no treatment.

When we consider that there are certain arteries that are more or less exposed to injury, that ligation of these vessels is attended with serious, and some times fatal, results, and in most instances by the loss of an extremity, we can realize fully the importance of dealing with wounds involving certain large arteries of the body. The popliteal, femoral, iliac, subclavian, axillary and common carotid arteries offer indications for surgical treatment in all cases of injury. Ligation should never be performed in dealing with these injuries unless all other measures fail. The immediate results of ligation, in most instances, while not fatal are serious and the remote results are often disastrous. There is no question that we should attempt to suture wounds in all of these arteries, with the possible exception of the common carotid. That the common carotid should not be considered an exception will be suggested when we remember that, according to Pilz and Klell, the mortality of ligation of one common carotid is fifty per cent. We thus see the advisability of attempting plastic operations in all injuries to this vessel.

At the present time, on account of the experimental work and clinical observations of Abbe, Israel, Zoege Von Mantuffel, Heidenhain, Murphy, Zeigler, Kümmel, Halstead and others, we are justified in suturing wounds, either longitudinal or transverse, or in attempting to make an arterial anastomosis in all injuries to these large arteries. While these efforts have not in all instances been followed by success the results are encouraging enough for us to advise against ligation or amputation and in favor of the above.

The method of operating has been suturing in cases of longitu-

dinal or transverse wounds, and arterial anastomosis in cases of complete division of the artery, or marked loss of arterial tissue.

Since the first work was done regarding wounds of the arteries two methods have been prominent in treating these injuries. It is probable that the suture method is the one of choice, although mechanical appliances seem in a fair way to success in dealing with complete division of the artery. Lambert in 1862, Czerny in 1881, Schede and Gluck later, made use of the suture method, while Abbe in 1894, and Itze and Payr more recently have experimented with mechanical appliances. At present there is no question that a longitudinal or transverse wound should be treated by suturing. Some operators prefer catgut, others use silk. The glass, rubber and ivory devices recommended in approximating transverse sections of an artery will probably not become popular. The absorbable, magnesium coupler, experimented with by Payr, may be the method of choice in uniting a completely severed artery. This method, so far as known, has not been tried on a human being, and at the present time we should attempt repair of an artery by Murphy's invagination and suture plan.

WOUNDS OF THE VEINS.

Operative or accidental venous wounds require surgical measures to stop hemorrhage, and to prevent the entrance of air into the vessels. Wounds of the smaller venous channels can usually be dealt with satisfactorily by compression. If this method is inapplicable or inefficient ligation or lateral suturing is indicated. The repair of a complete transverse division of a vein is rarely required. There is usually no objection to ligation in these cases.

SEPTIC PHLEBITIS.

Septic inflammation of veins may or may not demand operative treatment. The location of the involved veins and the extensiveness of the septic process modify the treatment. Septic inflammation of the uterine veins, of the internal jugular vein and of the sinuses of the skull have been dealt with elsewhere. Septic thrombo-phlebitis of the iliac and femoral veins, occurring as a complication of appendicitis or other abdominal infections, is rarely if ever amenable to successful operative treatment. Cases of phlebitis of the femoral and pelvic veins complicating uterine infections should be dealt with in a surgical way only when localized suppuration has occurred. The presence of

suppuration in these cases indicates ligation of the vein proximal to the suppurating focus, followed by drainage of the purulent collection, or, preferably, extirpation of the involved venous trunk.

Localized septic thrombo-phlebitis, occurring in the superficial veins as the result of injuries or infective processes are best treated by surgical measures. Proximal ligation of the diseased vein, followed by extirpation of the inflamed vascular trunk, will materially assist in preventing an extension of the inflammatory process or a general sepsis from an embolic dissemination. The danger in these cases is most serious in the later stages of the process, when the thrombus undergoes septic softening.

VARICOSE VEINS.

In discussing the indications for operative treatment of varicose conditions of the veins, the veins of the lower extremities only will be considered. Varicose veins of the generative organs, bladder and rectum are spoken of elsewhere.

Varicose veins of the lower extremities, involving the superficial or the deep canals, are best treated by operative measures. Operation is indicated in these cases when superficial or deep varicose venous trunks markedly inconvenience the patient by producing pain or ulcerative lesions.

Operation should not be performed in these cases if there is cause to believe that the deep venous channels of the extremity have been permanently occluded. Varicose veins that have followed an occlusion of the femoral vein complicating typhoid fever cannot be safely subjected to radical surgical measures in any instance. It is impossible to determine in these cases that the deep veins have or have not been permanently occluded; and for this reason obliteration of the superficial veins should be advised against in most instances. The same is true in a certain number of cases of varicose veins of the lower extremities following phlegmasia alba dolens. While it is doubtless a fact that the occluded veins more often resume their function after thrombosis from pelvic infection than from occlusion during typhoid fever, a permanent loss of function of the deep veins occasionally results in cases of milk-leg. In cases of varicose veins dependent upon, or associated with, a permanent occlusion of the deep vascular channels, the varicoses are manifestations of compensatory changes. In these cases obliteration of the superficial veins is a hazardous pro-

cedure, and should be advised against. Instances of gangrene of the lower extremity have been known following operations for varicose veins in cases showing clear histories of deep venous occlusion.

While it is doubtless impossible to determine positively in all cases of varicose veins of the lower extremities that the deep venous channels are or are not permanently occluded, there are certain coincidences and findings that assist in arriving at a conclusion in advising treatment for these cases. A history of a mild thrombosis speaks against a permanent occlusion. A thrombosis associated with marked septic symptoms is more likely to permanently occlude the vessels. Temporary occlusion of the superficial veins, accomplished by applying a constrictor at the base of the thigh not sufficiently tight to interfere with the deep circulation, may, in some instances, give information regarding the patency of the deep veins.

Operation of Choice. The most satisfactory method of treating varicose veins of the lower extremities consists of ligation of the internal saphenous vein at its termination, followed by extirpation of all markedly varicose venous channels. This operation can be done in a great measure by subcutaneous dissection. It is not difficult or dangerous to perform and gives very satisfactory results. A high resection of a portion of the internal saphenous vein cannot be depended upon to relieve varicose veins of the lower extremities.

Recurrences following this procedure are by no means rare, and Viannay has shown experimentally that occlusion of the proximal portion of the internal saphenous vein can rarely be depended upon to terminate the circulation in the distal portions of the vein.

Circular division and ligation of all of the superficial veins below the knee is not more efficient than extirpation of the veins, and is more likely to be followed by complications than is dissection of the venous trunks.

VARICOSE ULCERS.

Small ulcerations complicating varicose veins usually resolve when the diseased veins have been properly dealt with. If the ulceration is of moderate size, is of long-standing and is associated with the formation of a considerable amount of cicatricial tissue, the ulcer should be extirpated and the defect covered with grafts. Certain cases of extensive ulceration of the leg complicating varicose veins some-

times disorganize the extremity to such an extent that amputation is indicated.

ANEURYSM.

Aneurysms are progressive and, in almost every instance, permanent conditions that sooner or later terminate life. They are best treated by mechanical measures. For these reasons an aneurysm should be subjected to radical surgical measures whenever it is possible to do so.

The injection of gelatine, internal medication, compression and even wiring and galvanization should never have the preference over radical operative measures and are indicated only when the location of the aneurysm is such that radical treatment cannot be employed.

Of the operative procedures recommended for the relief of aneurysms extirpation is the method of choice and should be practised in all instances possible. Proximal or distal ligation are uncertain procedures and should be resorted to only when more radical methods cannot be applied.

It may be that in the future certain aneurysms can be treated successfully by total extirpation, followed by the interposition of a segment of vein between the cut ends of the artery. Carrel has shown, by experimentation on animals, that it is possible to resect a portion of a large artery and to restore the circulation through the vessel by suturing a segment of vein to the cut ends of the artery, thus allowing the arterial current to pass through the interposed venous segment. Carrel and Morel have demonstrated that it is possible for a segment of vein to transmit blood in the opposite direction; and that a portion of venous trunk, interposed between the cut ends of an artery, is capable of functioning for months. It is possible that this principle may be found applicable in the connection here spoken of.

Obliteration of the aneurysmal sac by suturing and at the same time not obliterating the affected vessel, has been recommended by Matas for aneurysm. The results of the reported cases speak favorably for this method. Its advantages are obvious and its field of application by no means limited. It should be at least attempted in dealing with any aneurysm that admits of direct operative treatment.

SPECIAL ANEURYSMS.

All aneurysms in the forearm or leg are best remedied by extirpation. In dealing with popliteal, brachial, or femoral aneurysms the

Matas method, proximal ligation, and extirpation should have the preference in the order given. In aneurysms of the axillary artery ligation of the subclavian is indicated.

ANEURYSM OF THE SUBCLAVIAN ARTERY.

The best method of treating these aneurysms has not yet been determined. Distal ligation is, as a rule, followed by little benefit. Extirpation usually means loss of the extremity. Proximal ligation followed by immediate amputation meets the indication and is probably justifiable in so serious a condition.

CAROTID ANEURYSMS.

Aneurysm of the external carotid should be treated by extirpation. An aneurysm involving the common carotid is a very serious condition. Proximal ligation or complete extirpation, although attended with immediate and remote dangers, is warrantable in dealing with these cases. Aneurysm of the internal carotid is best overcome by proximal ligation of the internal carotid if possible, or of the common carotid when necessary. Subsequent ligation of the vertebral should be done if operation on the carotid is not followed by improvement.

ANEURYSM OF THE INNOMINATE ARTERY.

Although surgical treatment offers the only hope of permanently curing aneurysm of the innominate artery the results of operation have in the past not been encouraging. At the present time there is no one surgical procedure that can be recommended in these cases. The results from ligation of the innominate artery are not sufficiently good to warrant us in advising this procedure. Ligation of the internal carotid and subclavian does not give encouraging effects. A case treated in Braun's clinic showed no improvement after ligation and died fifty-one days later. According to the opinion of Jacobstahl peripheral ligation in these cases increases, instead of diminishes, the blood pressure. It is probable that the results of the operated cases do not support ligation. Ninety-three cases of peripheral ligation, reported by Pivot, showed only seven and four-tenths per cent. of cures.

The reports of Jacobstahl show that in all probability McEwen's method of needling, filipuncture, administration of potassium iodide and the subcutaneous injection of gelatine, should be the method of

choice in treating aneurysms of the innominate artery. Fifty per cent. of the cases treated by this method have proven more or less successful. In one case cerebral softening caused death three and one-half years after the operation had been performed. It is not probable that the Matas method of dealing with aneurysm will be more successful in aneurysms of the innominate artery than have been the methods previously employed. At present therefore, we cannot expect permanent relief in more than a small percentage of these cases.

THORACIC ANEURYSMS.

Direct operative measures are not justifiable in aneurysms of the thoracic aorta. If the aneurysm is sacculated, wiring followed by galvanization, or the injection of gelatine should be given a trial. These methods may be expected to be successful in certain selected cases; and although uncertain in character and not without danger they are permissible procedures in attempting to relieve these progressive and fatal conditions.

ANEURYSM OF THE ABDOMINAL AORTA.

At present moment there is no satisfactory treatment for cases of aneurysm of the abdominal aorta. Surgical measures offer the best possible chance for permanently or temporarily relieving these cases. We are justified, if there is reason to believe that the aneurysm can be treated with any degree of success, in subjecting these patients to operative treatment by the methods advised by Moore and Sorradi, which consists of wiring and galvanizing the sac of the aneurysm.

Since Loreta, in 1885, first treated a case of aneurysm of the abdominal aorta by Moore's method, fifteen of these patients have been operated in this manner. In three instances, the cases reported by Moore, Noble and Langton, permanent cures followed the treatment. In the cases treated by Loreta, Pringle, Morris and Finney, a decided improvement followed. While these results are very unsatisfactory three cures out of fifteen operated cases is perhaps sufficiently encouraging for us to advise operation for all cases of aneurysm of the abdominal aorta that do not present positive contraindications for carrying out the method advised, and especially when no other treatment can be relied upon to produce results as satisfactory as those that have followed the operative treatment.

If it has been decided to subject an aneurysm of the abdominal aorta to surgical treatment, the work should be done at two sittings,

as advised by Matas. The first procedure should consist of exposure of the sac, so that the wire can be introduced without contaminating the general peritoneal cavity. After the sac has been exposed the wiring and electrolizing should be done about one week later. The direct treatment of the sac should be done according to the method described by Moore and modified by Sorradi. These procedures are very serious indeed, but are seemingly justified when the nature and outcome of these conditions are kept in view.

Not all cases of aneurysm of the abdominal aorta afford indications for operative treatment. No operative treatment should be attempted if the aneurysm involves that portion of the abdominal aorta that lies above the renal artery. The celiac axis, the superior mesenteric artery and other important branches that are situated so closely together on this short portion of the aorta give positive contraindications to the local treatment of aneurysms in this region. This statement excludes at least one-half of all cases of abdominal aneurysms from surgical treatment. Sebert has shown that at least fifty per cent. of the cases of aneurysm of the abdominal aorta are found to involve the vessel between the diaphragm and the origin of the renal arteries. All of these cases that have been turned over to operative treatment have been followed by a speedily fatal outcome. At the present time we are not justified in attempting any procedure to relieve these cases.

If the aneurysm involves that portion of the aorta between the renal arteries and the inferior mesenteric, surgical treatment might be attempted. A thrombosis of the inferior mesenteric artery is not necessarily followed by gangrene of a portion of the intestinal tract. In some instances the anastomosis between this vessel and the superior mesenteric and superior hemorrhoidal arteries is quite sufficient to nourish that portion of the intestine that receives its blood from the inferior mesenteric. The spermatic and ovarian arteries can be disregarded from the standpoint of thrombosis. Complete occlusion of these vessels is not followed by any serious results. Although an aneurysm of the second portion of the abdominal aorta may occasionally present reasons for surgical treatment, the great majority of these cases should not be operated upon, as the operative risk more than overbalances the possibility of obtaining a permanent cure.

Aneurysms involving that portion of the aorta below the origin of the inferior mesenteric artery call for operative treatment in all

cases. As a rule it is impossible to tell that an aneurysm originates from this portion of the vessel, but if there is reason to believe that the opening in the sac lies below the origin of the inferior mesenteric artery, operative treatment should be advised at once. The cases that have been successfully treated have been aneurysms of this portion of the vessel.

The greatest possible danger from attacking these aneurysms lies in the fact that a permanent occlusion may occur. Although it is possible that the sac and the vessel may be permanently and entirely occluded by the treatment this is not nearly so likely to occur as is thrombosis of the vessels arising from the aneurysmal sac or on a level with it.

It will be seen from the foregoing that if we accept the statements of Leibert, aneurysms of the abdominal aorta should, as a rule, not be given to operative treatment; that aneurysm of the second portion of the vessel may occasionally be treated successfully, but as a general rule we should only undertake operative treatment in cases in which there is every reason to believe that the portion of the aorta below the inferior mesenteric artery is the only one involved in the disease. Aneurysms in this location may be expected to be cured in perhaps forty per cent. of the cases given over to surgery.

Ligation of the abdominal aorta, done with the idea of securing a permanent cure in cases of aneurysm of this vessel, is probably an unjustifiable undertaking. Fourteen cases so treated died. Robert T. Morris is of the opinion that the operation may ultimately prove successful. He recommends that a temporary ligation be done, and that the ligatures should be removed as soon as the aneurysm has become filled with clotted blood. It is possible that the predictions of Morris may come true, but at the present time the reports of the operated cases do not seem to justify ligation of the abdominal aorta for any condition.

XXVI. THE NERVOUS SYSTEM.

FRACTURES OF THE SKULL.

Primary operative treatment may be required in cases of fracture of the skull to prevent infection, to remove foreign bodies, to elevate depressions, to relieve cerebral compressions, or to stop hemorrhages. In these cases it is always possible that secondary operations may be necessary to relieve infection, to close defects of the skull, or, in particular cases, to attempt to relieve certain motor or mental symptoms that develop in patients who have previously suffered from a fracture of the vertex of the skull.

INFECTION.

Operative treatment is indicated to cleanse the wound in all compound fractures of the vertex of the skull. If in these cases the dura has not been lacerated it should not be incised unless there is reason to believe that a large accumulation of blood is present beneath it. In these cases it is not necessary that the wound be drained. If the dura has been lacerated, or if it is found necessary to open the dura to stop hemorrhage or to remove blood clots, drainage should be resorted to. In some instances this will be unnecessary but as a rule primary drainage should be provided for in all cases of compound fractures of the skull associated with wounds into the dura. In fractures of the base of the skull no operative procedure is indicated to prevent infection, other than cleansing of the nasal cavities and the external ear.

FOREIGN BODIES.

All foreign bodies should be removed from wounds of the skull if they are superficially located. Bullets that have passed deeply into the brain structure and do not produce immediate symptoms should not be probed for at the primary dressing, and no attempt should be made to remove them at this time.

DEPRESSIONS OF THE SKULL.

All depressions of the skull should be elevated in cases of compound fractures. This applies to slight depressions as well as to more marked ones, and to children as well as to adults. If the dura has not been injured, and there is no reason to believe that a large

collection of blood lies beneath, it should not be opened and the wound need not be drained.

In cases of depression of the skull occurring in simple fractures, elevation should be resorted to in all cases, with the possible exception of very slight depressions in simple fractures in young children. It is possible that these cases may terminate in spontaneous elevation of the depression in a short time, and therefore for this reason operation is not imperative. On account, however, of the distressing and permanent symptoms that so commonly follow depressions in the skull, and in view of the fact that the operation of elevation can be easily and comparatively safely performed, the opinion is given that we should very seldom neglect to elevate a depression in the skull at the primary treatment. These operations do not, in cases in which the scalp has not been injured, require drainage. If large pieces of bone are removed they should be replanted, unless there is cause to believe that the field will be septic.

CEREBRAL COMPRESSION.

Surgical treatment is called for in cases of fracture of the skull to relieve cerebral compression. If the brain is being compressed by a depression in the skull, or by a cortical hemorrhage, operation should be done at once. If the compression is due to ventricular hemorrhage lumbar puncture should be done. It is probable that direct aspiration of the ventricles will not be indicated to relieve these patients. If the cause of the compression cannot be determined it will rarely be advisable to do a craniectomy to relieve the pressure. Most of these cases are very serious in character and little can be expected to follow surgical measures unless the indications can be plainly determined.

HEMORRHAGE.

Hemorrhage complicating fractures of the skull presents a clear indication for operation. If it is evident from the symptoms present or from the extent of the injury, that a progressive hemorrhage is occurring, or that a clot of blood is pressing upon the brain, operation should be done without delay. If the hemorrhage is expected to be found in the region of the anterior branch of the middle meningeal artery, the operation should be done in this location. If the cause of the trouble is not found at this site the posterior branch on the same side should be exposed. If the history of the case is clear and the

symptoms point conclusively to brain hemorrhage, and the hemorrhage is not found on the side of the brain opposite to the paralysis, the other side of the brain should be exposed without delay. There are a few cases on record in which the paralytic symptoms of the extremities and the hemorrhage were found on the same side of the body. These exceptional instances should not be lost sight of in dealing with any case of suspected meningeal hemorrhage. Indications for operation in cases of meningeal hemorrhage hold good in injuries unassociated with fractures of the skull, as well as they do in cases in which the bony structures have been damaged.

In cases of injury to the sinuses of the brain associated with fractures of the skull it many times happens that the depressed fragments prevent the escape of blood from the sinus. If there is reason to believe, from the location and extent of the skull injury, that a large sinus has been lacerated, and if no symptoms of hemorrhage are present, the opinion is that no operation should be done during the first twenty-four hours following the traumatism. Of course it is possible to control bleeding from the sinus with packing or by suturing. Nevertheless, if the depressed fragments prevent bleeding and no focal symptoms are present, operation should not be done until sufficient time has elapsed to permit of complete occlusion of the sinus.

SECONDARY OPERATIONS FOR SKULL FRACTURES.

If infection has followed the primary treatment in a fracture of the skull drainage should be instituted without delay. Operation should also be performed for a localized cerebral abscess resulting from this injury. The procedure in these cases should consist of drainage, and if possible the removal of foreign bodies, if there are any present. The important point in these secondary operations is to operate early, as soon as the symptoms of infection can be determined, or the localization of the abscess made positive.

REMOVAL OF FOREIGN BODIES.

Removal of foreign bodies after an injury has occurred should not be undertaken unless infection is present, or the foreign body is producing definite focal symptoms, and unless one is convinced that the body can be successfully removed. Portions of bullets or other foreign materials that do not produce distressing symptoms and are not associated with infection, need not call for removal. The fact that a foreign body is situated deeply in the substance of the brain does

not positively contraindicate an attempt at its removal, provided the symptoms from its presence are pronounced.

CLOSURE OF BONY DEFECTS OF THE SKULL.

Bony defects of the skull should be closed if possible at the time the injury occurs. If the fragments have been detached and cannot be replaced, loose pieces of bone should be broken up and the chips replaced in the aperture of the skull. If the wound is clean this method will succeed in the majority of instances. The size of the defect does not materially influence the result. If a bony defect of the skull remains after the primary treatment it is possible in most instances to close it by operative measures. This is true in all regions of the vertex of the skull, except with operations over the cerebellum. Nothing can be gained by operating to close bony defects over the cerebellar lobes.

The operation of choice in closing these bony defects of the skull should be osteoplastic whenever possible. The implantation of foreign material, while successful in many cases, should not be resorted to if it is possible to accomplish the result by making osteoplastic flaps.

MENTAL OR MOTOR SYMPTOMS FOLLOWING OLD FRACTURES OF THE SKULL.

If a patient is suffering from definite localized motor symptoms that have followed an injury to the skull, operation should be advised with a hope of relieving such symptoms. Of course it is possible that at the time the injury occurred complete destruction of the motor cortical area corresponding to the symptoms resulted. If this is true nothing can be expected from an operation. If, however, the motor symptoms are irritative, or if the paralytic symptoms are due to compression, either by depressed fragments or by cicatricial formations, operation would in all probability remove the cause of the symptoms.

In cases of obscure mental symptoms, associated with paroxysms, or with marked changes in the disposition, in which there is reason to believe from the history of the injury and from an examination of the skull that these symptoms are dependent directly upon the injury, operation should be advised without delay. This is especially true if a depression is present in the prefrontal region, anterior to the motor area. It has been pointed out conclusively that removal of this portion of the brain in animals induces complete changes in character, disposition and behavior. For these reasons and on account of the

successfully operated cases reported by Meyer, Hedges and others, we are quite justified in subjecting all of these cases to operative treatment, if we believe that the depression is present beneath the internal table, and that the symptoms did not exist previous to the occurrence of the injury.

CEREBRAL ABSCESES.

Cerebral abscesses are surgical conditions and demand drainage whenever the diagnosis can be made, when the abscesses are sufficiently localized and when the general state of the patient is such as to warrant an intracranial operation.

DEFECTS OF INTRACRANIAL DEVELOPMENT.

The serious congenital or acquired defects of intracranial development in all probability are not amenable to operative treatment. Within the last few years many of these operations have been performed, and sometimes with encouraging and occasionally with apparently brilliant consequences. Yet it seems that all of these operations must be considered experimental in character, and that the results cannot be depended upon to be permanent in any cases. Operations of this character should be carried out only with the idea of pure experimentation. The various theories, elaborated by many observers, regarding the etiology of these defective mental conditions, are not sufficiently accurate or convincing to call for their discussion.

TUMORS OF THE BRAIN.

The surgical treatment of brain tumors is at the present time an unsettled question. It is impossible to say with any degree of positiveness that operative treatment should be instituted for the majority of these cases, or that a certain class of these cases should always be subjected to operative treatment. In considering the advisability of operating in tumors of the brain it is essential to remember that all of these cases are fatal if not relieved by surgical means, and that early operation gives the best chance of securing a permanent result in such cases as are amenable to surgical treatment at all.

Indiscriminate operations undertaken for the relief of brain tumors that followed the reports of successful operations by Godlee and Horsley, resulted in a large mortality. The reaction that was noted after this too radical treatment caused an ultra conservatism that has existed until within the last few years. At present it is quite com-

monly agreed that operative treatment is not required in all varieties of brain tumors, and, according to Woolsey and Starr, perhaps only seven or ten per cent. of these cases demand surgical care.

TUMORS OF THE CEREBRUM.

Tumors of the cerebrum offer the best indications for operative treatment in all cases in which the tumor can be accurately localized in which the tumor is not multiple, in which the patient's general condition is good enough to stand a serious operation and in which evidences of malignancy are not discoverable in other portions of the body. The variety of the tumor, and many times the duration of its existence, do not modify the indications for operative treatment. The advice of Von Bergmann that operation should be limited to tumors involving the motor area is probably too conservative. Growths localized in other portions of the cortex can be as successfully removed as those that occupy the motor area.

When the existence of a brain tumor is entirely probable from the clinical symptoms and the history of the patient, but the growth cannot be definitely localized, operative treatment is not always contraindicated. If there are evidences that the growth is single, and if the patient's general condition is good, an early exploratory operation is entirely reasonable. The results, however, in operating upon these cases are by no means satisfactory. Operative treatment in 157 cases reported by Von Hippel was followed by a mortality of forty-seven per cent. In some of these the tumor was not localized and it is probable that a mistaken diagnosis was responsible for the absence of the tumor in some. While it is true that exploratory operations, and sometimes multiple craniectomies, are indicated in attempting to relieve brain tumors that cannot be localized, in the great majority of instances we shall do well to refuse operation in all but a few of such cases.

The statements made in the foregoing regarding brain tumors applies to malignant as well as non-malignant neoplasms. The surgical treatment of gummata and localized tubercles in the cerebrum has not been definitely settled. The advice of Horsley, which is borne out by other evidence, suggests that gummas are amenable to surgical treatment; their removal is not associated with a large mortality, and recurrence after removal is uncommon. It is probable, from the reported cases, that the treatment of localized tubercles of the brain is

on the same basis as that of gummata. These growths should be excised if their recognition and location can be determined, and if the general health of the patient is such as to render the operation within reason. Of course the diagnosis of a gumma, followed by progressive improvement under anti-syphilitic treatment, would not present operable indications.

Palliative operations for the relief of symptoms in cases of tumors of the brain are feasible under certain conditions. Some authorities of considerable experience highly recommend palliative operations for the relief of headache and impairment of vision. It may be that these exploratory operations produce considerable temporary relief in a number of these cases that are not amenable to radical operative treatment. In cases of brain tumor in which there is an excessive accumulation of fluid in the ventricles of the brain drainage has been resorted to which has been followed by good results in some cases. If it can be determined that there is an extensive accumulation of fluid in the brain cavity, and that a radical operation cannot be performed, drainage either from the lateral ventricles or by means of a spinal puncture should be advised to secure temporary relief for the patient.

The technic of operations done for the removal of growths of the cerebrum is so generally well known that a discussion on these points would be of no value. It is not out of the way, however, to suggest that operations on brain tumors should be divided into two stages, unless the tumor is small and the patient's general condition very good. Another point regarding these operations that has been insisted upon by Kocher and that should be kept in mind if we wish to deal with these cases successfully, is that early operation should be the choice. If there is reason to suspect that a brain tumor exists there should be no wasting of time waiting for progressive symptoms to develop, or in subjecting the patient to prolonged medication with the hope that the growth may prove to be syphilitic. If we have arrived at a decision to operate, and upon making exploration do not find the growth, multiple openings into the skull are justifiable in the hope that the tumor may be found. Temporary closure of the carotid artery, recommended by Crile, in doing operations on the brain should be resorted to only in exceptional cases, and then the occlusion should be limited to one side.

TUMORS OF THE CEREBELLUM.

Indications for operative treatment in tumors of the cerebellum do not differ materially from those of tumors of the cerebrum. The operation is in all probability more serious, but the same reasons hold good for tumors involving the large or the small brain. If a diagnosis of cerebellar growth can be made and it can be determined that the same is localized on one side or the other, operation should be done without hesitation. It is likely that little success will be met with in operating upon tumors of the vermis. It is impossible, however, to say that a growth is situated in this portion of the cerebellum, and therefore removal should be attempted if a positive diagnosis of a cerebellar tumor can be made.

The technic of operations for the removal of cerebellar growths does not differ materially from craniectomy for other lesions. It is unnecessary, however, to replace the bone that is removed when the cerebellar fossa has been exposed. It has also been shown that one lateral sinus can be exposed and ligated without material danger. The recent reports of operations done for the relief of cerebellar growths have been sufficient to impress upon us the advisability of diminishing the trauma to the cerebellar lobes to a minimum. It is probable that removal of a large portion of the cerebellar tissue by excision is preferable to extensive manipulation of this organ, or to pressure that might result from retraction. The increased pressure in the cerebellar fossæ, that is so commonly met with in operating upon growths in this location, must always be taken into consideration, and is best dealt with by puncture or by excision, rather than by compression.

TUMORS OF THE CEREBELLO-PONTILE ANGLE.

Since Forester in 1862 first discovered a case of what in all likelihood was fibroma of the acoustic nerve, a particular form of tumor has been known to exist in the cerebello-pontile angle. Recent studies by Woolsey, Frazier, Mills and others strongly suggest that these tumors are fibromatous in structure, benign in character, that they are of slow growth, not intimately connected with important structures, and present positive indications for removal. If there are symptoms suggesting that a tumor exists in the region of the acoustic nerve, as will be shown by early, progressive and long-continued evidences referable to involvement of the eighth, and possibly the seventh nerves, operation should be advised and performed promptly.

These tumors are readily removable, but are difficult to reach. It has been shown that a craniectomy into the cerebellar fossa does not expose these growths satisfactorily. Their removal through an opening in this location is necessarily associated with a considerable amount of trauma to the cerebellar structures. The operation advised by Krause for section of the eighth nerve by means of a lateral craniectomy should be the operation of choice in removing growths of the cerebello-pontile angle. A craniectomy should be made above the petrous portion of the temporal bone, which affords the shortest possible route for attacking the cerebello-pontile angle. Work by this method also does away with the difficulty produced by the increase of pressure in the cerebellar fossæ that is so commonly associated with these growths.

It is probable that if these benign, slow-growing and slightly adherent tumors are early recognized, and if operation is done at a reasonably early date, the results will be very encouraging from the standpoint of the relief of symptoms and the non-recurrence of the tumor.

INJURIES TO THE SPINE.

Injuries involving the spinal canal are of a very serious character. The immediate shock is usually severe, but the greatest danger lies in the remote results that follow damage to the spinal cord. The call for operative treatment in these cases depends entirely upon the amount of destruction done to the nervous tissue, and the possibility that is offered for relieving the symptoms. From the standpoint of surgical interference the injury done to the bony structures should not receive consideration. It has been shown conclusively that repair of the bony framework of the spine can be expected in almost any case of serious spinal injury; but the conditions are quite different when the nervous structures of the spine are considered. Regeneration in the nervous system cannot be relied upon in any case. Although it may be possible that the cellular structure of the spinal cord is capable of regeneration under certain influences, we have no evidence that is sufficiently convincing to warrant us in assuming that the spinal cord itself will ever undergo regeneration, after injury, sufficient to restore function. One or two instances have been recorded in which it was believed that regeneration of a completely severed cord took place. But such cases are certainly mere excep-

tions to the rule and do not give us a right to assume that regeneration of the central nervous tissue can or does occur.

It is generally accepted that no operative intervention is indicated or justified in any injury to the spinal cord in which the paralytic symptoms point to complete destruction of the cord. In these cases we are to operate only when there is reason to believe that the loss of function has resulted from compression, and not from destruction of the nervous tissue.

HEMATORRHACHIS AND HEMATOMYELIA.

Hemorrhage into the spinal cord, or from the spinal membranes, is a rare affection. It does happen, however, after certain injuries, and after certain diseases involving the vascular system. We shall discuss here only the cases of spinal hemorrhage that follow injuries, and in which no bony deformity or fracture can be determined. If it can be found from the character of the injury, and the onset and type of the symptoms, that the hemorrhage is from the spinal meninges, operative interference is indicated provided that the symptoms are increasing, or do not disappear spontaneously. If, on the other hand, there is reason to regard the hemorrhage as involving the structure of the cord itself, very little can be expected in the way of relief by operation. If the case is one of hematorrhachis and hematomyelia of the spine, it is probable that operation could do no good. If it is possible to determine that the intensity of the symptoms results more from the meningeal hemorrhage than from the cord hemorrhage, the patient should be given the benefit of the doubt and be subjected to surgical operation. The case observed by Reader in the Hamburg City Hospital was one of this character. No operation was done and there was no cause to believe, from the postmortem findings, that operative interference would have given relief. Although no definite rules can be laid down concerning the treatment of these cases, it is usually unadvisable to operate if the cord symptoms come on suddenly, produce complete paralysis and are not associated with severe pain. These symptoms are altogether strongly suggestive of an intra-spinal hemorrhage. Although it is possible that an intra-spinal clot could be removed with safety, it is probable that the injury done to the nervous tissue in performing the operation would be so severe as to contraindicate it at once. Notwithstanding the great majority of these patients die, it is reasonable to believe that as many will re-

cover without operation as with it. If in a case of spinal injury the patient complains of diffuse girdle pains and in a short time there occur evidences of paralysis of part of the spinal cord, with a gradual progression of the paralytic symptoms, there is reason to hold that the hemorrhage is from the meninges. If, in the same case, there exists muscular rigidity, or even spasmodic or clonic muscular contractions, or acute pains referred to the surface of the body, there is good reason to believe that a meningeal hemorrhage is the cause. All of these cases should be subjected to operation if such symptoms are severe, if the involvement of the cord is extensive, or symptoms progressing in severity, or remaining the same. If a patient gives a history of a moderate hemorrhage from the covering of the cord, but is slightly improving, no operation should be advised so long as the improvement continues.

DISLOCATIONS OF THE SPINE.

Dislocations of the spine, without fracture, are of rare occurrence. Reduction has been accomplished in the great majority of these cases without resorting to operative means. It is improbable that a complete dislocation of the spine has taken place, or can occur, without producing serious compression symptoms. The indication in these cases is to reduce the dislocation as soon as the patient has recovered from the immediate shock of the injury. If this cannot be accomplished by manipulation it should be done through open incision. There is nothing to be gained by deferring reduction in these cases. If the cord symptoms are due to compression and the compression cannot be relieved, there is no possibility of the patient's condition being bettered. If the injury to the cord has resulted in complete destruction nothing will be lost by reducing the dislocation, even if operation is necessary.

FRACTURES AND FRACTURE DISLOCATIONS OF THE SPINE.

Surgical intervention is certainly indicated in all fractures of the spine associated with spinal cord symptoms in which there can be determined a positive depression of the posterior spinal arch, and in which there is evidence that the bodies of the vertebræ have not been displaced. The paralytic symptoms in the majority of these cases are due to spinal compression and not to destruction of the cord. Complete paralysis with loss of reflexes, and loss of control of

the sphincters, is no contraindication to operation here. Of course it is possible that complete destruction of the cord has occurred, but if the bodies of the vertebræ have not been displaced the symptoms of a complete spinal destruction are not sufficient in themselves to contraindicate operation. Most of the brilliant results that have followed operative procedures in fractures of the spine have occurred in this class of patients.

If from the history of the injury and an examination of the patient, one is led to believe that a considerable displacement of the bodies of the vertebræ is, or has been, present the question of operation should be guided by the symptoms of involvement of the spinal cord. If at the primary examination there is reason to consider that the entire cord has not been destroyed, operation is surely called for. If the reflexes are present, or if sensation in certain parts exists, or if the sense of determining heat or cold is intact, complete destruction of the spinal cord has not occurred. In these cases we should operate. If, on the other hand, there is absolute paralysis of all spinal cord functions below the seat of injury, we are not safe in all cases in saying that complete destruction of the cord exists and that operation can do no good. McCosh, Oliver and others make positive statements that complete loss of function of the cord does not in all cases mean destruction of it. Weeks, Kansch, Schede and others have reported cases that show complete paralysis of the cord without destruction of it. It is generally accepted that we are not in a position to determine from the symptoms in any case that complete destruction of the cord obtains. We do know, however, as McCosh has stated, "That if symptoms be allowed to persist for days or weeks the case will be hopeless."

In treating these cases we should not neglect to operate upon a patient because the symptoms evidence complete paralysis of the cord. The statement of Bastion that "permanent loss of reflexes indicates complete transverse lesion of the cord" can no longer be relied upon. Many instances have been recorded that conclusively prove its incorrectness. It seems that it is our duty to give patients the benefit of an operation if we are not positive that destruction of the cord has occurred, and I agree with McCosh that we are not generally right in delaying operations until degenerative changes have followed.

If complete transverse destruction of the cord has taken place no good can be expected by performing an operation. It has been

shown by Chipault that when the cord has been severed retraction of the coverings occurs. If this is the case there is very little ground for believing that a complete regeneration is possible. If, however, an operation is done with the hope that the symptoms resulted from compression and not destruction, and a complete separation of the cord is found, the membranes should be brought together and held in place by sutures. While it may be believed that no good will come from this, yet if it is possible that regeneration of the spinal cord can occur under certain conditions, we have placed the parts in the best possible position to aid in such a process.

The Best Time to Operate.—The advice of Horsley, Hammond, et al., to operate on these patients at once, seems to be unadvisable in most instances. The opinion is here ventured that there is nothing to lose, and many times much to gain, by deferring operation until the symptoms of shock have disappeared. Again, the advice of Lauenstein to wait six or ten weeks before operating on these patients does not appeal to one as giving the patients the best chance for relief. We all know that in the serious cases infections, bed sores and probably degenerative changes in the cord will occur before the six or ten weeks have passed. The results of the operated cases show that the most marked improvement has followed early operations. This is especially true in considering the more serious injuries.

In conclusion we may say that primary operative intervention is indicated in all cases of fracture of the spine in which the bodies of the vertebræ are not displaced, in which complete paralysis of the cord does not exist and in which the symptoms can be reasonably attributed to meningeal hemorrhage; and that we have nothing to lose in most instances in advising operative treatment in cases showing complete paralysis of the cord, especially if the patient is in good condition to withstand the operation and is desirous of receiving the benefit of the doubt.

I have purposely omitted discussing the treatment of injuries of the spine occurring in different localities. It is generally admitted that fractures of the cervical region are much more serious than those lower down. The indications for operative treatment, however, are the same.

Operative Treatment for Old Cases.—It frequently happens that long-standing cases of spinal fracture-dislocation present themselves for treatment. We are reasonable in operating upon these patients

when the paralytic symptoms are not complete. If the paralytic symptoms are complete no operation should be advised. If destruction was not responsible for paralytic symptoms at the time the injury occurred, the compression existing for a considerable period of time would certainly result in degeneration of the nervous tissues, and operation could do no good. If, on the contrary, complete paralysis existed at the time the operation was performed, and some improvement followed, we may assume that degeneration is not complete and that some good can be done by an operation. The question of time that has elapsed between the occurrence of the injury and the performance of the operation does not appear to be an important one when complete paralysis has never existed. Oliver, Lauenstein and others have operated thirty-five days after the injury occurred and obtained satisfactory results. McCosh reports a case that was operated eight months after the injury. Starr performed an operation for fracture of the lower region of the spine one year after the injury occurred. Satisfactory results were achieved in all of these cases. Wyeth performed an operation two years after the spine was fractured; the results were very satisfactory indeed. Arnison reports a similar case in which he obtained equally encouraging effects.

Although the reports of fractures of the spine treated without operation, and also of those that were subjected to both early and late operative measures, are of little value in determining the rational method of procedure to be adopted in treating these cases, we are no doubt reasonable in assuming that operation should be more generally advised, and that early operation should not be undertaken in all cases. In the hopeless cases very little can be expected by operation, but it is also true that very little can be lost. These operations are usually well borne by the patient, but if death occurs, there is some satisfaction in knowing that no possible hope for recovery could be held out in other directions. The statement of Cline, made in 1814, applies as well now as it did then, viz., "The only reasonable objection to the operation of trephining a spine is that we cannot, previous to the operation, ascertain whether the spinal cord is simply compressed, or whether it be partially or entirely torn through, or whether symptoms of compression resulted from effusion of blood in different situations; neither of which, indeed, can be ascertained after the vertebral canal has been opened, unless the sheath be rent." Strange as it may seem, this, to my mind, voices the generally ac-

cepted opinion of to-day. The statements, however, and the earlier references regarding the advisability of doing late operations should be discarded. While we are not to advise operations indiscriminately for these patients, it is believed that early surgical interference applies to the great majority of them. The statement of Mayer seems to me sufficiently applicable in this relation to quote. Mayer is of the opinion that, "Upon the evidences of statistics of recent years, an operation is justified no matter how doubtful the case may be. While the operation is essentially experimental and its results problematical the striking cures accomplished within recent years must spur us on to the performance of the operation."

GUNSHOT FRACTURES OF THE SPINE.

Gunshot fractures of the spine rarely offer an indication for surgical interference. The great majority are very serious from the outset and if the cord has suffered injury at all it is usually completely destroyed or so badly injured as to favor early disintegration. Primary operative interference is not called for in these cases for the purpose of locating the bullet, or to cleanse the wound.

The indications for surgical treatment in this class of injuries correspond to those of fractures of the spine due to other causes. If one is convinced that paralytic symptoms are due to pressure from the bullet, bony fragments, or blood clots, operation may be necessary. If, on the other hand, the paralytic symptoms indicate total destruction of the cord, and there is reason to believe, from the extent of the local injury, that the cord has been severed nothing can be expected from surgical endeavors. Although it may be possible that operative treatment can do good in some of these cases, it is an exception to the rule.

LUMBAR PUNCTURE.

Lumbar puncture for diagnostic purposes has been practised for a considerable length of time, and is recognized as an efficient procedure in this connection under certain circumstances. The therapeutic value of the measure is undetermined. Although it has been productive of good results many times in various conditions, still the procedure is uncertain when applied as a curative agent. As a rule the conditions for which lumbar puncture are recommended, for its therapeutic value, are of such a serious character that it is doubtful

if little can be effected in the way of relief for these conditions, no matter what measures are used as treatment.

Repeated removal of the cerebro-spinal fluid through lumbar puncture has given satisfactory results in a considerable number of cases of cerebro-spinal meningitis. Then again many cases of meningitis that did not show severe symptoms at the time the puncture was made manifested absolutely no signs of temporary or permanent improvement. It is generally admitted that lumbar puncture is not only justified, but is positively indicated as a therapeutic measure in all cases of cerebro-spinal meningitis. The operation should be done early and should be repeated as often as the symptoms warrant.

Good results have followed simple aspiration in cases of meningitis, but from a study of the reported cases it is gathered that simple removal of the fluid, followed by injection of salt solution and chemicals, will be productive of better effects than are usually obtained when simple aspiration is resorted to. Seager advises the treatment of spinal meningitis by withdrawing the fluid, followed by the injection of salt solution and from nine to twelve cubic centimeters of a one per cent. solution of lysol. In one case he removed fifty cubic centimeters of spinal fluid, then resorted to the injection, as recommended, and repeated the procedure several times. A satisfactory result was obtained. This method has been tried at Lisbon in thirty-one cases; the results were, on the whole, encouraging and show a very low mortality for such a serious disease as cerebro-spinal meningitis. Eighteen of the thirty-one cases were cured, while only thirteen of them succumbed. Manges has resorted to this method in treating three cases, with satisfactory consequences.

As has been stated in the foregoing, it is impossible at present to say that the treatment practised by Seager, or simple spinal puncture, can be relied upon as an efficient method for treating these diseases. The condition is a very serious one and in all probability spinal puncture affords as much relief as does any other known mode of treatment. Further experimentation and reports of cases will no doubt show that the results from chemical injection are little more satisfactory than simple removal of the fluid. Present reports warrant us in advising either simple removal of the fluid, or removal followed by lysol injection, in all cases of meningitis. It is not to be expected

that the majority of these cases will recover. It does not appear that we have a more efficient method for treating this class of patients.

Another disease for which spinal puncture has been recommended and practised is hydrocephalus. A study of the reported cases indicates that there has been no selection made of the type of disease that has been treated by spinal puncture. This, in all probability, is an important point when we consider the pathology of the affection. If an internal hydrocephalus does not communicate with the spinal subarachnoidean space puncture could, in no manner, drain the excessive accumulation of fluid. If, however, there is basis for the belief that spinal puncture will remove the excess of fluid, it offers the same indication for relieving the symptoms and obtaining results as does drainage from the cranium. It is usually considered a safer procedure than direct drainage of the ventricles, but has not been shown to be productive of more favorable results. Although one or two cases have been reported of temporary, and even prolonged, benefit following spinal puncture or secondary hydrocephalus, I am of the opinion that the operation does not meet the pathological condition and cannot be regarded as a valuable method for treating these cases. The procedure is not without danger and should not be advised with the idea of obtaining permanent relief. If spinal puncture is to be employed for the relief of acute or chronic hydrocephalus it must be determined, if possible, that a free communication exists between the ventricles and the subdural spinal space; that the head is compressible; that the bones are flexible and show no evidences of ossification at the fontanelles or sutures.

There are a few cases of tetanus that have been treated by spinal puncture; satisfactory results having been recorded in most instances. In 1900 Eichorn treated a case of tetanus by spinal puncture, followed by the injection of antitoxin. This patient recovered. Murphy, of Chicago, has used spinal puncture in a case of tetanus, followed by the injection of morphine, eucaïne and salt solution. The treatment was repeated and the result obtained was satisfactory indeed. Although it is likely that spinal puncture, followed by injection, will be found an efficient method for treating tetanus no positive statement can be made regarding the value of this procedure at the present time. The method, however, is not serious or difficult and should be given a trial in all of these formidable and usually fatal affections.

Wilson has advised and practised with success lumbar puncture in cases of uremia and eclampsia. It is impossible to say at present that spinal puncture is or is not indicated in treating these conditions. It certainly appears that the removal of the spinal fluid does not meet the pathological indications, and can be expected to produce only temporary relief. In all probability lumbar puncture will not become a popular treatment for uremia and eclampsia. The procedure, according to the reports of Wilson, gives such a degree of hope of obtaining relief that it should be recommended in all cases of these serious diseases.

Tuffier has recommended spinal puncture as a therapeutic agent in cases of skull fracture. Although it is possible that the method may be of service in relieving some of the symptoms in these injuries, it is improbable that spinal puncture will be found to be of value in treating the great majority of cases of fracture of the skull. It may be resorted to if there is occasion to regard that the symptoms of cerebral compression are due to collections of blood in the ventricles and that there exists a communication between the ventricular cavity and the subdural space.

Although it is generally admitted that lumbar puncture, as a therapeutic agent, may be of value in treating certain conditions, the procedure should not be indiscriminately advised and should not be held entirely without danger. In the majority of instances no doubt lumbar puncture can be performed without detriment to the patient. Serious results, however, have been recorded as following this procedure. Gumbrecht has reported seventeen cases of sudden death following spinal puncture done for diagnostic purposes. When the operation is done for the relief of hydrocephalus these fatal terminations may be more frequently expected. Henneberg has shown that occasionally certain definite, serious and permanent spinal cord lesions have been known to follow lumbar puncture. He was able to present to the Berlin Society for Psychiatry two spinal cords in which puncture had produced hemorrhage into the cauda equina. Serious symptoms were present in these patients.

When we consider that spinal puncture is not without danger, and that it is productive of good results in only a certain number of cases, we should recognize plainly the limitations of the procedure and should not recommend it unless the demands are marked. Indiscriminate application of lumbar puncture in all cases in which there

is only a remote possibility that benefit might be derived from it should be advised against. The operation should be done only in cases in which it has been shown that there is reason to believe that some decided good effect will come from it, and in which the conditions from which the patient is suffering are such that it is unlikely the simple puncture will be followed by immediate or remote serious results.

TUMORS WITHIN THE SPINAL CANAL.

Early surgical treatment is definitely called for in the great majority of tumors involving the spinal cord or its membranes. Operative treatment in these cases has given very good rewards and offers the only hope of obtaining a permanent cure. Early operation should be the principle for all of these cases.

A study of the operated cases, since the publication in 1888 of a case operated upon by Gowers and Horsley, shows plainly that surgical treatment gives sufficiently satisfactory results to be insisted upon. The mortality of the operation, if done in properly selected cases, and carried out with the correct technique, is not large. In the fifty-one examples collected by Lloyd the mortality was approximately ten per cent. The records of McCosh, and others who have reported operative cases more recently, prove that the mortality in removing spinal tumors is very low; they show, also, that the results are extremely satisfactory if operation has not been unduly delayed. The great majority of cases operated usually offer encouraging immediate and remote results. This is true in dealing with malignant growths as well as benign tumors.

The opinion may be given that early operative treatment should be advised in all cases of spinal tumors in which the symptoms are localized, that is, in which there is no rapid extension of the pressure symptoms. It is not always necessary that a positive diagnosis should be made. If there is reason to believe, from the symptoms and the findings, that the existence of a spinal tumor is probable, experimental operation should be advised if the symptoms are progressing in severity.

Radical operation for the relief of spinal tumors should not be recommended in all cases. This operation should not be undertaken if the spinal cord tumor is of a malignant character and is secondary to a primary growth in another part of the body. If, on the other

hand, it is believed that the tumor involving the cord is malignant and extends over a large area of the cord, radical operation should not be undertaken. Nonne reports a case of sarcoma that involved the entire cervical and thoracic portions of the cord. In this case the symptoms were progressive in character, showed extension of the involvement from below upwards, and were rapid in their development. No operation should be advised in cases of this character. Although it is possible that cases like the one reported by Nonne, and malignant growths in which the involvement of the cord has been extensive before a diagnosis could be made, may occasionally present themselves for treatment, the great majority of spinal tumors offer definite symptoms which will enable a reasonably early diagnosis to be made, and most of these tumors are localized. For these reasons operative treatment will be positively indicated in the great majority of spinal tumors. The immediate and remote results, even in malignant cases, are very satisfactory indeed. Sarcomas of the cord, which perhaps constitute one-third of the cases of spinal tumors, are not prone to recur if early and complete removal has been done.

If a case of spinal tumor is so far-reaching, or from any other reason does not present a positive indication for operative treatment, palliative measures may be used with advantage in relieving certain distressing symptoms. Division of the sensory nerve trunks is justifiable in combatting severe pain.

TIC DOULOUREUX.

Owing to the fact that the pathology of trifacial neuralgia at the present time is undetermined, that certain procedures that have been recommended to relieve this condition give inconstant results, and that occasionally a case occurs, as was observed by Sherman, that contradicts, to a certain extent, our knowledge of the pathology and nature of this affection, we are unable to recommend any line of treatment for the generality of these cases. It is commonly conceded, however, that the most serious and obstinate cases yield only to operative treatment, that many of the mild cases do not require operative measures, and that often spontaneous relief, for a certain length of time, may be expected.

The most severe cases are probably relieved completely and permanently only by intra-cranial operations that remove the Gasserian ganglion, or destroy its communication with the central nervous sys-

tem. These operations are very serious in character, but in almost every instance produce complete relief and as a rule the results are permanent. Operations of this character are indicated only when the disease is severe and of long-standing, when less radical measures, that is, peripheral resections or the injection treatment of the affected nerves, give only temporary, or no relief at all, and when the patient's general condition is sufficiently good to withstand an operation of formidable character. Even when these conditions are present and the case seems a favorable one the mortality must be expected to be extraordinarily high when we consider that the operation is done for a condition that does not threaten the life of the patient.

If it has been decided to perform an intra-cranial operation for the relief of tic douloureux, it is generally accepted to-day that division of the sensory root, behind the ganglion, with removal of a portion of this root if possible, should be the operation of choice. Spiller. Frazier and Von Gehuchten have shown to the satisfaction of the majority of observers that division of the sensory root proximal to the ganglion, is as efficient in securing permanent results as removal of the entire ganglion. It is probable that excision of a portion of this sensory root would be still more radical in preventing regeneration of the nerve trunks. Removal of the ganglion can be depended upon to secure permanent results in the great majority of instances, but the operation is undoubtedly more serious than simple division of the sensory trunk, and if, as Spiller has shown, it does not produce better or more permanent consequences, physiologic removal of the ganglion should be the operation of choice in dealing radically with these serious cases of neuralgia of the fifth nerve. Avulsion of the sensory trunk of the ganglion, after it has been divided, is probably unnecessary and doubtless is a dangerous procedure. The opinion is that it should not be done in any case. Von Gehuchten states that definite and serious injury to the pons may result after avulsion of this large sensory trunk.

On account of the critical nature of these intra-cranial operations Abbe has recommended a method that he believes to be effective and at the same time not extremely dangerous. He urges division of the second and third branches of the Gasserian ganglion, close to their foramina of exit, with the interposition of rubber tissue between the cut fibers. The objection to this operation is that it is probably not so efficient in securing results as are the intra-cranial

methods, and that it does not attack the first division of the nerve. It may be the operation of choice in dealing with certain serious cases in which the process does not involve the ophthalmic branch of the fifth nerve, and in which the patient's general condition contraindicates a more serious procedure.

Van Gehuchten recommends a procedure that is practically as serious as that advised by Abbe for the relief of these cases that cannot be treated by operations on the ganglion itself. He divides the peripheral branches of the nerve and removes the nerve trunks by avulsion. It is probable that his operation cannot be depended upon to secure as good results as by the intra-cranial methods.

If it is not thought advisable to subject a patient suffering with trifacial neuralgia to intra-cranial operation, peripheral excision of the nerve trunks may be done. These resections give complete relief in the great majority of cases for a short time; occasionally they succeed in producing a permanent cure. As a rule a recurrence may be expected in from six to twelve months. These operations can be practised without endangering the life of the patient, but should never be considered equal to the more radical measures, from the standpoint of complete and permanent relief.

The destruction of peripheral nerves, the seat of neuralgic pains, by the injection of a one and one-half to two per cent. solution of osmic acid into the nerve trunks and into their foramina has been followed with success by Murphy and others. It is probable that these operations are dependent upon a chemical destruction of the nervous tissue for their results, and cannot be expected to be more radical than are peripheral excisions. As the injection treatment, to be carried out successfully, requires anesthesia and exposure of the nerves it is quite reasonable that it has no advantages over peripheral removal of the diseased nerves. The operated cases have not been observed sufficiently long to say that the injection method is or is not more permanent than are the simple excision operations.

All cases of trifacial neuralgia are difficult to treat and produce no small annoyance both to the surgeon and to the physician. All of the mild cases and those that show an involvement of only portions of the nerve should be treated by large and repeated doses of castor oil before any operative procedure is advised. All serious and long-standing cases that do not yield to this treatment are perhaps best cared for by division and removal of a portion of the sensory root

behind the ganglion, providing the patient is in a very good condition and is willing to submit to so serious an operative undertaking.

PARALYSIS OF MOTOR NERVES.

Paralysis of a motor nerve that is dependent upon a loss of the nerve structure, or a division of the nerve trunk, can be relieved only by surgical measures. We are correct in attempting to restore motion in most of these cases. The preferable method to-day in dealing with these motor paralyses is implantation or anastomosis. The operation was probably first successfully performed by Sick and Sanger, in which case the distal stump of the musculo-spiral nerve was implanted into the intact median. The result was very satisfactory indeed. Since that time perhaps a dozen similar operations have been done, and according to the reports of Kennedy, Despres, Dumstreya, Trzebicky and others, the operation may be expected to terminate successfully in fifty per cent. of the cases.

If from a resulting injury there exists a loss of nerve substance, so that it is impossible to bring the divided ends of the nerve together, anastomosis should be the operation of choice, if a motor nerve is accessible. If this cannot be done osseous resection of the bones of the extremity should be considered in order that the divided nerve can be approximated. Suturing á distance, that is, bringing the nerve defect with catgut, or other material, has been unsatisfactory and cannot be recommended to restore function in these cases. Tubalization has been equally unsuccessful in these defects of the motor nerve.

In dealing with these cases we should attempt to bring the divided ends of the nerve together and if this cannot be accomplished, anastomosis with a neighboring motor nerve should be the method resorted to. Although failures may be expected to follow a number of these operations, the procedure is not attended with unusual danger and a good result may be looked for in a certain number of these otherwise hopeless cases.

FACIAL PARALYSIS.

Operative treatment is indicated for the relief of facial paralysis in all cases in which the peripheral portion of the nerve has not been destroyed, and in which the cause of the paralysis did not destroy the motor nerves in the region of the facial. The work of Ballance, Stewart, Körte, Frazier, Taylor, Cushing, Clark and others,

has shown conclusively that we are justified in making an anastomosis between the peripheral branch of the facial nerve and a portion of the spinal accessory or the hypoglossal. The operation is not difficult and from the reported cases gives encouraging results. While anastomosis between the accessory and the facial nerves has been more extensively practised, it is probable that the hypo-glossal should be utilized in preference to the spinal accessory. It has been shown that the centers of the hypoglossal and facial are close together, and it is probable that the control of the facial muscles will be more readily acquired if the motor impulse is carried through the hypoglossal than it will be if the spinal accessory is utilized to supply the portion of the facial that has been destroyed.

These operations may be done in all cases of facial paralysis due to middle ear disease or to lesions close to the nucleus of the nerve. At the present time it is impossible to say that the results will be satisfactory in all instances, but enough work has been done along this line to justify us in assuming that the majority of such operations will be followed by marked improvement.

XXVII. THE EYE AND ORBITAL CAVITY.

INJURIES OF THE ORBIT.

The indications for treating orbital injuries differ in no way from those in injuries to other portions of the body, except that infection in this region is liable to be followed by serious consequences to the eye. The abundance of loose cellular and fatty tissue in the orbit predisposes to rapid extension of infection, and for this reason exceptional precautions should be taken to prevent such involvement. All accidental orbital wounds should be drained at the primary treatment, and multiple incisions into the orbital cavity should be made early in the course of orbital cellulitis. The removal of tissue in these cases should not be advised unless the infective process is complicated with an intraocular wound or with panophthalmitis.

INJURIES TO THE EYEBALL.

In injuries of the eyeball infection, the presence of foreign bodies, the vision of the eye and sympathetic involvement of the uninjured eye are the most important considerations that demand attention. All foreign bodies in the anterior chamber of the eye should be removed at the primary treatment. It is also well to remove foreign bodies in the vitreous at the primary treatment if vision has been destroyed. If the sight in the injured eye has not been completely lost and a foreign body is lodged in the vitreous, no attempt should be made to remove such foreign body until the dangers of accidental infection from the injury have subsided. If no inflammatory process complicates the injury, the foreign body should or should not be removed according to its size, location and interference with the function of the eye.

Infection is perhaps the principal consideration in treating all penetrating wounds of the eyeball. Superficial cleansing is all that is necessary in attempting to relieve infection in accidental wounds. The indications for dealing with the infection after it has developed depend, in a great measure, on the location of the wound and the vision of the injured eye. Wounds of the anterior chamber may commonly not be considered serious from the standpoint of infection, while wounds in the ciliary region associated with marked impair-

ment or loss of vision in the injured eye, present an indication for removal of the eyeball. In these cases the injured eye will be rendered permanently useless, and early enucleation, under these circumstances, offers perhaps the best chance of preventing sympathetic ophthalmitis. The presence of infection complicating a wound in the ciliary region, associated with little impairment of vision, is best dealt with by the expectant plan of treatment. If the infection progresses and a panophthalmitis develops, the cornea should be widely incised and the contents of the eyeball removed with a blunt instrument. This terminates the acute infective process and usually aids materially in preventing complications in the uninjured eye.

If the infection in the injured eye does not progress in severity and the vision is not markedly impaired, the injured eye should not be removed, even if symptoms of sympathetic ophthalmitis are rapidly developing in the other eye. It is probable, in these cases, that removal of the injured eye would not arrest the disease changes in the sympathetically involved eyeball, and the vision remaining in the injured eye would prevent a total blindness.

Injuries to the eyeball producing dislocation of the crystalline lens should be treated expectantly until the wound to the globe is healed. If infection has not occurred the dislocated lens should be removed after recovery from the accidental wound.

INFLAMMATORY CONDITIONS OF THE CONJUNCTIVA.

These rarely require operative treatment. It is true that some of the complications resulting from cicatricial contractions following inflammations of the conjunctiva demand operative treatment, but generally conjunctivitis presents no indications for operation unless localized collections of pus require drainage. Certain forms of trachoma constitute exceptions to these statements. Trachomatous granulations should be expressed mechanically; and in certain severe and long-standing cases of trachoma that have resulted in marked disorganization of the lid a portion of the conjunctiva and the tarsal cartilage can be removed with advantage.

INTRAOCULAR OPERATIONS.

The indications for the performance of intraocular operations are as a rule well understood. Before any of these operations are undertaken it is important that every precaution against the occurrence of infection be observed. No intraocular operation for a chronic or sub-

acute affection should be performed if a mild or even a chronic conjunctivitis is present. The inflammatory condition in the conjunctiva should first be eradicated.

GLAUCOMA.

Surgical treatment will as a rule be indicated in most cases of glaucoma. In certain mild forms of chronic glaucoma the judicious and prolonged use of miotics may be sufficient to give the patient relief; but operative treatment will be necessary in some part of the course of most cases of glaucoma. The acute and subacute forms of simple and hemorrhagic glaucoma call for early operative treatment. These cases should not be allowed to progress to the stage that markedly impairs vision. Neither should operation be delayed until pernicious changes have occurred in the disc. On account of the fact that a chronic glaucoma gradually progresses in severity, that the condition, if of long-standing, materially interferes with the function of the eye, and that acute glaucoma sooner or later develops in these cases, early operative treatment is consistent in all acute and subacute forms of glaucoma and in all well-marked cases of chronic glaucoma.

The operation that is indicated in these cases will be either iridectomy or removal of the sympathetic cervical ganglia. At the present time the efficiency of and indications for these operations are matters of discussion. It has not been clearly determined that one operation is more valuable than another, neither can we say that one of these operations is always to be selected in a certain form of glaucoma.

Iridectomy is generally believed to be the step of choice in the acute and serious forms of glaucoma. From the reported operated cases it is probable that sympathectomy should not be the operation of choice in performing the primary operation to relieve acute or hemorrhagic varieties of this disease. In chronic glaucoma it appears that sympathectomy is more efficient as a rule than iridectomy, and should be the method of choice.

A great deal has been said for and against each of these operative procedures to relieve glaucoma. Many operators of large experience believe that iridectomy is to be done in all acute varieties of glaucoma, and that it is an efficient procedure, if done early, in preventing the progress of the more chronic forms of this disease. It has been shown

conclusively that iridectomy is capable of permanently relieving a certain number of chronic glaucomas.

Sympathectomy is at the present time to a certain extent an experimental operation. Although it has been of value in dealing with a certain percentage of acute glaucomas, it is more positively indicated in the chronic varieties of the disease. If done early in chronic cases it appears to be more efficient than iridectomy. The vision is sometimes improved to a considerable degree after this operation, but Cutler and others report cases in which no improvement of vision followed sympathectomy. The permanency of cure following sympathectomy for chronic glaucoma has not been ascertained. Rodgers reports a case in which the patient was relieved for a long time; while Grunert, Demicheri, Cutler, Starr, and Weeks believe that sympathectomy produces more permanent results than iridectomy.

In favor of sympathectomy are the facts that the mortality of the operation is very low and serious complications extremely uncommon. So far as I am able to determine this operation has not resulted in death in a single instance. According to Grunert and Wilder sympathectomy might predispose to hemorrhage in performing a secondary iridectomy. The relation of sympathectomy to hemorrhage has not been determined, but it seems fairly reasonable that this operation is not likely to predispose to bleeding in doing secondary operations upon the eye.

DACRYOCYSTITIS.

The mild and chronic forms of dacryocystitis rarely require operative treatment. Most of these cases are dependent upon stenosis of the lachrymal duct. In these cases the duct should be dilated. If it is impossible to overcome the stricture in the duct, or if the inflammation in the lachrymal sac continues after the duct has been opened, the lachrymal sac should be removed. The removal of the lachrymal sac for chronic inflammations is not so much necessary on account of the seriousness of the affection as it is to prevent the occurrence of ocular complications. These may be expected to develop in most instances if a chronic dacryocystitis is allowed to remain for a prolonged period.

Acute suppurative dacryocystitis does not necessarily demand removal of the sac. These cases should be drained. If a fistula follows the drainage, or the suppurative process becomes obstinate, the

sac should be removed. Chronic catarrhal inflammation of the lachrymal sac associated with organic stricture of the duct, or with osseous disease, presents indications for excision. The sac should also be removed in acute blennorrhoea of the lachrymal sac, associated with *ulcus serpens*, or when it becomes necessary to perform intraocular operations. A chronic inflammatory condition in the lachrymal sac should be cured by operation before an operation for cataract or glaucoma is undertaken. Tuberculosis of the lachrymal sac is reasonable cause for extirpation.

It is not necessary in removing the lachrymal sac to take away the corresponding lachrymal gland. The lachrymal sac is not removed to prevent epiphora, but to destroy inflammatory conditions that threaten to produce serious complications. If, after the enucleation of the lachrymal sac, epiphora markedly inconveniences the patient, then the lachrymal gland should be removed without delay. This operation is not a serious or complicated one, and the absence of the gland does not materially affect the eye. The glands of the conjunctiva produce sufficient moisture to prevent xerosis of the cornea or dryness of the eye.

XXVIII. THE EAR AND MASTOID.

Acute inflammatory conditions involving the external ear require surgical intervention only when they result in the formation of localized collections of pus. Drainage is then indicated.

Chronic disease processes affecting the external ear that are responsible for the continuation of a suppurative or non-suppurative inflammatory condition thereof, should be relieved by operative measures if they are amenable. A chronic suppurative process in the external auditory canal should, if possible, be terminated. These apparently innocent inflammations are occasionally responsible for the occurrence of serious complications. They are easily corrected when they are confined to the external ear, and although sometimes insignificant warrant operative treatment. Polypi, hyperostoses, exostoses or other benign and obstinate conditions, should be promptly dealt with, especially if they are associated with a chronic purulent inflammation in the external ear.

ACUTE SUPPURATIVE OTITIS MEDIA.

Operative interference, that is, incision of the *membrana tympani*, is undoubtedly called for in all cases of suppurative inflammations of the middle ear. No time should be lost in incising the membrane as soon as the diagnosis has been made. This procedure is not so imperative on account of the immediate relief that it affords, as on account of the prevention of serious complications and extensions of the suppurative process that would be practically unknown if middle ear suppurations were drained efficiently at their beginning.

It is not always easy to determine that suppurative otitis media exists. This is especially true in the very early stages of the disease. Catarrhal inflammations of the middle ear simulate very closely suppurative inflammations, especially at the commencement. Incision of the membrane is not necessary if the inflammatory condition is catarrhal in nature. Both of these diseases have an acute onset and produce severe pain. The presence of a chill, however, with rapid elevation of temperature and marked increase of the pulse rate, occurring a few hours after the onset of the pain, suggest that the inflammation is of a suppurative character. When these symptoms obtain it seems that in all cases we should incise the tympanic mem-

brane. If a mistake has been made and the condition is not suppurative, no serious harm has been done to the patient. The immediate relief, even in catarrhal otitis media, will be great. If suppuration does not occur the incision in the drum will heal rapidly and will not produce any serious after effects. On the other hand, if the inflammation is suppurative in character, great benefit has been done to the patient, not only in the relief from temporary symptoms but by preventing possible serious complications. The opinion is advanced that prolonged, suppurative inflammations involving the bones of the middle ear, the mastoid, and even extending to the cerebral sinuses and brain, would rarely occur if the middle ear was efficiently drained early in the course of the disease.

If the suppurative process in the middle ear has progressed to a stage where spontaneous perforation has occurred, enlargement of the opening may be advisable many times. If the spontaneous perforation does not relieve the local and general symptoms to a considerable degree, then the membrane should be inspected and the opening enlarged if necessary. If the opening is very small, and one is led to believe that the drainage is not adequate, incision of the membrane should be done, even if the perforation has been followed by considerable relief. If a nipple-like perforation has occurred incision of the membrane should be resorted to for the reason that this type of opening affords little drainage.

CHRONIC SUPPURATIVE DISCHARGE FROM THE MIDDLE EAR.

It is difficult to determine when operation is or is not indicated in cases of chronic suppurative inflammations of the middle ear that have followed acute diseases. Some of these cases will recover under proper local treatment, others necessitate operation before they get relief. Miligan is of the opinion that if a chronic suppurative otitis media has existed for a period of twelve months, or resists faithful local treatment for three months, operation should be advised; and the extent of the operation should, of course, depend upon the extensiveness of the inflammatory process. It is difficult to determine, and more difficult to point out, definite symptoms and findings that plainly suggest an operation in these cases. Long-standing purulent inflammation in the middle ear is dependent on necrosis of the bony walls of the tympanum, and suppurative inflammation in the mastoid, or,

in many cases, a combination of both of these conditions exists. If the inflammatory action is limited to the contents and bony walls of the tympanum, operations on the mastoid are not indicated. Ludewig claims that removal of the ossicles of the ear, through the external auditory meatus, is entirely sufficient in these cases. He has done this operation one hundred times and reports a cure in eighty per cent. Grunert, Schroeder, Dench and Panse believe that cleaning out the tympanum through the external ear is a very valuable procedure and has a large field of usefulness, but do not report a percentage of recoveries that is so encouraging as Ludewig's. A little over fifty per cent. of their cases were permanently relieved by this operation.

Although it is generally admitted that cleaning out of the tympanum through the external auditory meatus is all that is necessary in a large number of these cases, it is difficult to determine when this operation will be sufficient and when the mastoid should be attacked. The previous history of the primary involvement of the ear is of no small importance in determining the indications for operation. If the primary symptoms were severe and were associated with tenderness or swelling over the mastoid region, with diffuse radiating pains extending to the side of the head, it is very probable that the mastoid was involved in the suppurative inflammation. Even though the symptoms have become chronic, operation on the middle ear alone will not suffice in these cases. If at the time the examination is made there can be found even slight tenderness over the mastoid antrum, on deep and continuous pressure, the radical operation, according to the Shwartz-Stack method, should be advised. If, on the other hand, the primary symptoms do not suggest the extension of the inflammatory process beyond the tympanum, and there is no evidence of chronic involvement of the mastoid, operation through the external auditory meatus should be advised. Chaettle, Grunert, Zeroni, Schroeder, Bent and others are advocates of the more frequent use of the operation, limited to the middle ear only. They think that many times the mastoid has been explored when the less serious procedure would have obtained as satisfactory a result.

Chronic suppurative inflammation of the middle ear, due to tuberculous infection, constitutes a reason for operative procedure limited to the tympanum only.

Chronic hypertrophic otitis media, associated with disagreeable symptoms and deafness, should be treated by complete cleansing of

the tympanic cavity. Burnett reports favorable results following this procedure when vertigo was a prominent symptom.

Whenever his operation is performed, great care must be taken that the entire incus is removed. It may be difficult to find portions of this bone, or the entire bone may have been destroyed, but the operation should not be considered complete unless it is determined that the incus is not present, or has been removed. Dench advises curetting of the bony portion of the tympanum after the ossicles have been removed. He considers this an important part of the operation for the reason that superficial necrosis is very commonly found in this class of cases. Ferrier and Bennett look upon curettement of the inflamed tympanic walls as a very dangerous procedure. They think that it is not only unnecessary in most instances, but that it is positively dangerous.

The Mastoid Incision. Incision over the mastoid region, extending down to, but not into the bone, should not be resorted to as a palliative measure. This incision should be done only to relieve subcutaneous abscesses or mastoid periosteal inflammations. The local abstraction of blood by such means does not give enough temporary or permanent relief to warrant us in doing it. It is very seldom that the incision will be called for to open abscesses alone. Superficial abscesses in this location are occasionally found, but they are by no means common. Periostitis over the mastoid region is, according to Heiman, not a primary condition. In the great majority of these cases suppurative involvement of the mastoid is present, and at the same time an incision is indicated to relieve the periosteal inflammation, exploration of the bone is demanded to relieve collections of pus in the antrum.

Operations on the Mastoid. The two important questions in connection with the doing of an operation on the mastoid are, when is the operation indicated? and if operation is indicated, how extensive an operation should be done? In acute involvements of the middle ear in which there is cause to regard that the suppurative process has passed on to the mastoid antrum, operation upon the antrum is indicated. Although it is claimed by some that purulent inflammation in the antrum will resolve spontaneously, I agree with Dench that this termination can rarely, if ever, be expected. Although it is generally agreed that pus in the antrum is an indication for evacuation, it is not always easy to determine that a suppurative inflammation exists.

in the mastoid. The continuance of the symptoms after the drum has been perforated, in acute cases, with or without the presence of swelling in the mastoid region, is suggestive enough for operative interference if tenderness is present in Macewen's triangle. If the tenderness is slight but increases when the pressure is made continuously the existence of pus is all but positive.

In considering the question of operating on a mastoid affected with long-standing suppuration, the general condition of the patient associated with a combination of all the symptoms from which he complains, is of much more importance than the presence or absence of any one particular symptom, or of any local finding. Tenderness over the mastoid, associated with a train of local and general complaints suggestive of chronic inflammation, and occurring in connection with a purulent discharge from the middle ear, points clearly to exploration of the antrum. If in cases of chronic discharge from the ear the amount suddenly becomes lessened, and at the same time general and local symptoms of infection develop, operation should be performed at once. The results of operative procedures in these chronic cases are so satisfactory that I believe if we are in doubt as to the advisability of the operation, we shall be doing the patient an injustice if we do not operate on all cases in which there is reason to suspect, from the symptoms and findings, that a suppurative condition exists in the mastoid. The opinion is held that pus in the mastoid cells and antrum can and does exist for a long time without giving positive symptoms; and that no prolonged symptoms, associated with a purulent discharge from the ear, will resist the ordinary methods of local treatment unless there is bony involvement, either in the middle ear or the mastoid, or, as is so commonly the case, in both of these situations.

If it has been determined that an operation is indicated the question then to be decided is whether simple drainage of the mastoid antrum will or will not be all that is necessary. If the condition is an acute one and the symptoms seem definitely located in the mastoid region, the simple operation will usually give relief. If, however, a considerable amount of destruction has been done to the bones of the middle ear, as will be suggested by the chronicity of the disease and previous discharge, radical operation, attacking at the same time the mastoid and the tympanum, should be undertaken. There is nothing to be gained in subjecting these patients to two operative pro-

cedures. Of course it is possible, as Zeroni has stated, that operation on the tympanum only would quite suffice in some of these cases. If there is reason to suspect involvement of the mastoid antrum the radical operation should be advised as the primary treatment.

BEZOLD'S PERFORATION.

If suppuration in the mastoid region has progressed to such an extent that eruption into the digastric fossa has occurred, operation should be done at once. If a cervical abscess has resulted from the perforation, this should be drained and at the same time the radical operation on the mastoid and middle ear performed. Lewis, Neniére, Lermoyez and Masini have operated on such cases with success. If the suppurative condition has advanced to such a degree as to escape beyond the mastoid, either on the convex surface or into the digastric groove, the indications for operation are positive.

MENINGITIS.

Meningitis, due to direct extension of middle ear suppuration, is not common and would not occur at all if the proper treatment was not neglected in these cases. In most instances a meningitis exists before a primary operation is performed. If primary drainage has been resorted to before a suppurative meningitis has developed, it will rarely occur that a post-operative meningeal infection will develop. Serous meningitis or meningeal inflammation that has not advanced to suppuration, will usually disappear if drainage of the antrum and middle ear is effected. If suppurative meningitis exists at the time the operation is performed, it is best drained into the tympanum. This can usually be done with ease and in the great majority of cases prevents the extension of the meningeal involvement.

If a suppurative meningitis, resulting from middle ear infection has advanced to such a stage that pus is found in the cerebro-spinal fluid, aspirated by lumbar puncture, the condition has reached a stage where operation can do no good. In less serious cases the patient should be given the benefit of the operation, even if the chances for recovery are slight.

SINUS THROMBOSIS.

Invasion of the cerebral sinuses, secondary to middle ear and mastoid suppurations, are rare occurrences. When found it goes to show that the proper treatment of the patient has been neglected. These

serious and life-threatening complications should not occur in this class of infections. Primary drainage will prevent sinus involvement in practically all cases. If the sigmoid sinus is affected by an extension of the inflammatory process, immediate operation is demanded. Although it is possible that an aseptic thrombosis may occasionally occur under these conditions, such an event will be rare. The majority of the sinus changes are due to direct involvement by the inflammatory process. It is difficult, or impossible, in all instances to determine that the sinus is or is not affected. In most cases, involvement of the sinus is accompanied by severe general symptoms of infection. A chill and rapid elevation of temperature and pulse rate are to be expected in most instances. Cerebral symptoms may or may not be present. Local symptoms, dependent on cerebral involvement, are not a part of the symptomatology of sinus involvement. Tenderness over the occiput, along with general evidences, is of great importance in recognizing this condition. If this is associated with tenderness over the jugular vein, it is a positive sign that the sinus is diseased. Stirling says that moderate edema and puffiness of the eyelids is a certain indication of the involvement of the sinus on the affected side. In other words, that interference with the circulation in the cavernous sinus explains this symptom. Gerhardt, Hessler and Whiting are of the opinion that occlusion of the sinus can be determined by making external pressure on the external jugular vein on the affected side. If the sinus is thrombosed the compressed vein does not distend, but marked engorgement of the opposite vein can be noticed.

If involvement of the sinus is associated with septicemic or pyemic symptoms, the case has in all probability gone to such a stage that relief cannot be obtained by operation. If sinus involvement is present before operation on the middle ear and mastoid has been accomplished, the sinus should not be attacked at the primary operation unless a direct communication exists between the cavities that are opened and the infected sinus. If this is the case, the sinus should be explored and drained only. If involvement of the sinus does not occur until the primary operation has been performed, or if the primary operation, with drainage of the suppurating sinus, does not give benefit, then an operation must be undertaken to relieve the thrombosed and infected veins.

CEREBRAL AND CEREBELLAR ABSCESSSES.

When from the general and local findings the existence of a cerebral or cerebellar abscess can be made out operation is to be done at once. If evidences go to show that the abscess is in close proximity to the tympanum it should be drained into the tympanic cavity. A primary operation in cerebral abscess, following middle-ear infection, should never be undertaken. The mastoid and tympanic cavities should be explored thoroughly and drained. If during this operation it is found impossible to drain the brain abscess then a craniectomy should be done and the abscess opened.

XXIX THE NOSE, ETHMOIDAL AND SPHENOIDAL SINUSES, AND THE ANTRUM OF HIGHMORE.

EMPHYEMA OF THE FRONTAL SINUS.

Collections of pus in the frontal sinus generally call for surgical treatment. In the acute cases that are secondary to nasal inflammations efficient drainage may be secured by operating through the nasal cavities. This method is usually insufficient to secure permanent results, and should be employed only in exceptional cases. In most instances suppuration of the frontal sinus should be treated by making a frontal opening into the sinus and by establishing drainage, both into the nasal cavities and through the frontal wound. These operations will be entirely adequate to cure the large proportion of acute cases.

Cases of chronic suppurative disease of the frontal sinus resulting from simple inflammatory conditions, or from tuberculous infections, require extensive operative procedures to secure permanent results. Although at the present time there is no definite method that has been accepted by all as being the one of choice for operating upon these cases, the opinion is that the method described by Killin, of Freiburg, in 1895, meets the indications more thoroughly than does any other. The operation advised and practised by Killin consists in removing the anterior and inferior walls of the sinus, followed by thorough exploration of the entire cavity, with removal of the median septum if that is thought expedient. The frontal process of the superior maxillary bone is then removed, and the anterior ethmoidal sinuses are inspected and explored, if necessary. Free drainage is then established into the nasal cavity and the obliterated sinus is also drained through the supra-orbital wound. The supra-orbital margin of the frontal bone is not destroyed in this operation for the sake of lessening the deformity. The reports of those who have given this operation an extensive trial are hopeful enough to warrant us at the present time in selecting this method in preference to all others in chronic and extensive suppurative processes in the frontal sinus. The method obliterates the infected cavity, provides good drainage and does not produce extensive deformity.

THE ANTRUM OF HIGHMORE.

Empyema of the antrum of Highmore in all cases gives us a clear indication for drainage. In acute varieties of this disease that follow infections originating in a tooth of the upper jaw, simple drainage of the cavity through the tooth socket will many times be all that is required to produce a permanent cure. If the condition is of long existence, however, this should not be depended upon to secure permanent cure. In all severe cases of empyema of the antrum drainage should be provided for through the canine fossa. The cavity should be explored through this opening and irrigation can be used if thought advisable.

Acute suppurations of the antrum, that have resulted from infection through the nasal cavities, may occasionally be treated successfully without an operation. It is possible that these cases may be treated satisfactorily by washing out the cavity through the ostium maxillare. In many of these affections accessory openings are also found from the nasal cavity into the antrum. It is believed by Giraldis, Hartmann and Zuckerkandel that these accessory openings are the result of pathological conditions. They are supposed to be found in ten per cent. of those suffering from disease of the antrum. It is held that washing of the infected antrum through the nasal cavity will, in the majority of instances, be insufficient to produce a permanently curative result. This procedure should be recommended only for the mild and acute varieties of infection of the antrum.

If an empyema of the antrum has existed for a lengthened period of time drainage should be provided for through the canine fossa, and also into the nasal cavities. This very complete drainage is followed, in most instances, by rapid recovery.

Chronic empyema of the antrum, due to simple or to tuberculous infections, requires in practically all cases resection of the canine fossa, and the production of a large opening, on a level with the floor of the antrum, into the nasal cavity. The recent reports of Friedrich and other workers, show that this radical drainage is a very satisfactory method of dealing with these chronic and serious affections of the antrum. Healing takes place within a comparatively short time if the openings have been large and the drainage thorough.

In performing an operation for empyema of the antrum of Highmore it is not essential that the operation be extended to the other

sinuses in this region. Many of these cases are not associated with infections of the ethmoidal sinuses, and the operation should not go beyond the antrum unless clearly demanded. Jensen makes a positive statement that in all cases of empyema of the antrum suppurative processes exist in the other nasal sinuses. In all of these cases he not only drains the antrum, but extends the operation into the ethmoidal sinuses and some times into the frontal sinus. It seems quite certain that the advice of Jensen cannot be relied upon, and that in most instances empyema of the antrum of Highmore is not associated with suppurative lesions in the neighboring sinuses.

THE ETHMOID SINUSES.

If a purulent inflammation exists in the ethmoid sinuses drainage should be effected. If the condition is acute and is not complicated with marked obstructions in the nasal cavities simple drainage will be enough to secure a good result. If the turbinated bones show evidence of marked disease and interfere with drainage of the sinus, they should be removed and at the same time; if destruction of the bony structures in the vicinity of the sinus is present, curetting should be done. A thorough removal of the diseased tissue should be resorted to in all cases of inflammation of the ethmoidal sinuses associated with marked destruction of tissue. Removal of bony tissue should be accomplished in those so-called necrosing cases, which were described by Wokes years ago.

In performing all operations on the ethmoidal sinuses especial care should be taken not to produce a perforation of the cribriform plate. This accident is likely to occur if the operator is not very careful when removing tissue close to the base of the skull.

THE SPHENOID SINUS.

Suppurative inflammation of the sphenoid sinus is of uncommon occurrence, is difficult to diagnose, and oftentimes dangerous to treat radically. If a probable diagnosis of this condition can be made, the opening into the sinus should be sought for with a probe. Grünwald makes the statement that in forty per cent. of these cases it is possible to pass a probe into the sphenoid sinus. It is doubtful if this applies generally to practitioners. The opening, however, should be diligently sought for, and if found, and pus follows the withdrawal of the probe, the diagnosis is positive and drainage should be provided

for. Drainage of the sinus is a somewhat dangerous operation. The opening should always be made in the anterior wall, and should be accomplished by using a blunt instrument, or preferably, a punch forceps. The opinion is offered that curetting of the sinus will rarely be necessary to secure permanent results.

NASAL OBSTRUCTIONS.

As a rule obstructions in the nasal cavity demand operation. A polypus, a malignant growth, an inflammatory condition, a bony spur, or hypertrophy of the turbinated bone in almost every case should be relieved. These conditions inconvenience the patient and sooner or later are responsible for distressing complications. The operation for their removal is not dangerous to perform and the results are in most cases satisfactory, if the work is properly done.

ADENOIDS.

It is believed by many that all collections of adenoid tissue in the nasal pharynx of children should be removed by operation. It is true that some of these growths do not produce marked symptoms, and occasionally they may disappear without materially distressing the patient. As a rule, however, most of them are responsible for mouth-breathing, attacks of inflammation in the throat, involvements of the ear, and sometimes of the eye, and occasionally they cause marked changes in the patient's general health. Operation is also indicated on account of the fact that these growths many times produce definite changes in the voice, and it has been shown beyond doubt that they are responsible for alterations in the development of the superior maxillary bone and, to a certain extent, other bones of the face. For the foregoing reasons, and on account of the ease with which these operations can be done, we are entirely right in advising removal of these adenoid growths.

XXX. TUMORS.

For a long time during the past, and at the present time, tumors have been regarded as surgical conditions and have been treated successfully, as a rule, only by operative measures. At present it is generally believed that if a tumor comes under any form of treatment, that treatment, to have a satisfactory result, must be radical removal of the growth. The knowledge on which this advice is based is surgical in character and does not depend upon scientific fact or experimentation, but rather on the knowledge gained from clinical observations and operative experience.

Although tumors have been studied for years we know comparatively little to-day regarding them. Their nature and histogenesis are disputed questions. Their relation to trauma and other etiological factors has not been accurately fixed. The peculiar behavior of some of the varieties in relation to lymphatic structures of the body, and also regarding the effects produced upon the general system, have been by no means explained. In fact, there is little if anything that is positively known regarding tumors.

Most surgeons believe that adventitious growths are not closely associated with infection and that the proper treatment in most instances is radical removal. It must be remembered, however, that our knowledge regarding tumors is in no way positive, and exceptions to the rule, in a clinical or pathologic way, should be carefully studied.

Although, as has been stated in the foregoing, the subject of tumors is in a sense a mysterious one, we have learned to recognize the relation between the symptomatology and the pathological changes in many of these growths. And while, at the present moment, radical and wide removal of the growth is probably the operation of choice in dealing with most varieties of tumors, this treatment has, in some instances, been too indiscriminately applied. Many times mutilating operations have been performed for the relief of semi-malignant or certain varieties of malignant tumors when less radical operation would have given equally good results. For this reason we should study carefully the variety of tumor under care, and should not be ready to sacrifice an extremity for a growth that can be treated successfully with less radical measures. Of course, it is good practice to

make the operation too extensive rather than incomplete, but many times mutilating operations are unnecessarily performed for the relief of certain so-called malignant tumors.

The methods of treatment advised for the relief of malignant and non-malignant growths, other than radical removal, have not proven valuable enough to be given consideration. It is true that certain superficial, epithelial, benign or malignant tumors can be treated with apparent success by the application of chemicals, or by actinic or X-ray exposures, and it is equally true that certain serums have given seemingly encouraging results in certain varieties of sarcoma. Nevertheless, these methods can be relied upon to produce permanent effects only in a few selected instances and should in no sense be looked upon as rivals of the radical removal.

BENIGN EPITHELIAL TUMORS.

Benign, epithelial tumors occur uncommonly. They produce symptoms only on account of their mechanical presence, are easily removed and rarely, if ever, recur. These growths therefore call for operative treatment only when they inconvenience the patient, or when they are the seat of ulcerations or secondary infections. It is probably good practice, many times, to remove benign growths, especially of the ovaries or internal organs, with the idea of preventing malignancy developing in them. While it is no doubt true that sometimes these benign, epithelial growths become cancerous, such changes are of rare occurrence and one is led to the opinion that a surgical operation should seldom be performed with the purpose of preventing benign epithelial growths from undergoing changes ordinarily recognized as cancerous in nature.

BENIGN MESOBLASTIC TUMORS.

The reasons for operating upon benign connective tissue growths do not differ materially from those described for benign epithelial tumors. It is probable, however, that certain forms of mesoblastic tumors are more apt to become sarcomatous than are benign epithelial growths. These tumors should be removed in all instances if they are large, if they produce pressure symptoms that are serious, if they produce pain or result in marked deformity. The radical treatment of these growths is very successful. The operations are, as a rule, not difficult to perform, and recurrences seldom, if ever, follow complete removal.

MALIGNANT TUMORS.

Epithelial malignant tumors that are slow-growing in character, and are situated superficially either on the skin or mucous membrane, may occasionally be treated successfully without a radical operation. As a rule, however, every malignant tumor offers an indication for operation unless the growth has advanced to such a stage as to render complete removal improbable, or has so affected the patient's general health that operative treatment would be extremely dangerous. In doing these operations we should remember that desperate chances are justifiable, that the growth invariably terminates in the death of the patient, and that no other form or variety of treatment can be relied upon to eradicate it.

CARCINOMAS.

It is impossible to lay down definite rules in respect to the indications for operative treatment in all cases of carcinoma. The location of the tumor, the effect that the growth has produced on the general welfare of the patient, the presence of regional or metastatic involvement and the general appearance of the growth, of course all point to the extensiveness of the disease and its malignancy but do not tell definitely the chances of complete removal or the likelihood of a recurrence if an operation is undertaken. It is generally known that advanced carcinoma of the uterus, of the stomach, of the liver, of the prostate, of the small intestines and other organs, can almost never be completely cured; while carcinomatous disease in the breast or in the face that has advanced to a marked degree can sometimes be permanently relieved. Generally we are able to determine with a certain degree of positiveness the probable outcome of the case, but many exceptions to the rule are found. The fact of these exceptional cases need not necessarily make us more timid in performing radical operations in these doubtful cases, but should suggest that it is our duty in all to give the patient the benefit of operative treatment. Of course, if the symptoms and findings are such that it is apparent the case is hopeless only palliative measures should be attempted.

In operating upon carcinomas several fundamental principles as to the nature of the disease must be recognized. In the great majority of instances of carcinoma of the breast, or of carcinoma of the uterus a local recurrence and not a regional or metastatic involvement,

follows incomplete operation. This fact suggests that we must cut far from the seat of the disease in removal of all of these growths.

Another condition more or less characteristic of cancer is involvement of lymphatic tissue. No operation should be performed for the relief of carcinoma unless the regional lymphatic glands are dissected. A possible exception to this statement may be found when dealing with cancer of the uterus, but as a rule if it is possible to remove the lymphatic glands draining the seat of the tumor this should be done at the time primary operation is performed. Recurrences in portions of the body distant from the tumor are not common following operations for cancer. If we succeed in removing the entire growth in its primary location, and dissect all infected glands, general metastasis will rarely develop unless present before the operation.

The indications, then, for or against attempted removal in cases of carcinoma depend, to a great extent, upon the location of the tumor, the size of the growth and the regional involvement. If there is reason to hold that the primary focus can be entirely eradicated it is reasonable to expect that the patient may be freed from the disease. In certain malignant sarcomas, the reverse is true. While it is easy to remove the local growth, general dissemination occurs early and removal of the primary growth does not insure against speedy development in other portions of the body.

SARCOMA.

The indications for surgical treatment in cases of sarcoma do not differ materially from those for carcinoma. As was stated in the preceding section, local recurrences are uncommon after operation for sarcoma, while dissemination of the growth in many of these cases occurs early, and for this reason radical operation rarely does good in the rapidly-growing varieties of sarcoma. These facts do not contraindicate operation, but suggest that a guarded prognosis should always be made and that secondary growths in other portions of the body must be carefully looked for.

Coincident involvement of the regional lymphatic structures is not frequent in most varieties of sarcoma. The disease may be well advanced in its local situation, or even pronounced growths may be found in other portions of the body, and still the lymphatics remain normal. In the ordinary forms of sarcoma involvement of the regional lymphatics usually suggest an ulcerating growth, or a closed

tumor the seat of mixed infection. It suggests strongly a mistake in diagnosis in some of these cases. In one form of sarcoma, however, the lymphatics are affected early and almost constantly. I refer to the melanotic growths that are found in the skin. These tumors may remain local for a long time but in some instances, after they begin to develop, are extremely rapid in their course. They involve the lymphatic glands early and while the tumor may not become large, secondary growths spring up rapidly and are usually multiple. These should always be removed early in their course, but even if the operation is carried out the patient cannot be assured that he is free from the disease until after several years have passed without signs of a return.

Semi-malignant sarcomatous growths are not uncommon and furnish indications for operative treatment in all instances. The difficulty in advising operation in these cases is that the true nature of the growth many times cannot be recognized, and we are apt to consider the case a malignant one and advise an unnecessarily severe operation when local removal and bony excision would produce equally good results as would a mutilating and serious operation on the trunk or the removal of an extremity. These semi-malignant growths do not show a tendency to recur at the original location of the tumor and do not frequently result in the production of metastases.

LYMPHATIC CYSTS.

Lymphatic cysts, while not true tumors, may properly be discussed under the head of mesoblastic neoplasms. The affections are congenital and occur most frequently in the neck, in the axilla or in the thoracic region. They are not malignant in nature and produce symptoms only from their mechanical presence. They many times disappear spontaneously at or about the time of puberty. For these reasons it is not necessary that these cysts be removed. If they are large, if they inconvenience the patient or if they are growing rapidly they should be subjected to surgical treatment; otherwise no operative treatment is demanded.

EXOSTOSES.

Exostoses of the skull, or of the long bones, are not true tumors, nor have they proven to be inflammatory, or developmental irregularities. They are treated successfully only by operative measures, but

as a rule do not present indications for surgical treatment. They rarely, if ever, become malignant and do not produce ill effects on the patient's general condition.

The sessile variety of exostoses that occurs most commonly on the bones of the skull, can be removed safely and successfully in most instances but should not be interfered with unless they become of large size, produce marked deformity or from their weight discommode the patient.

The pedunculated variety of exostoses occurs most frequently in the long bones, particularly the lower extremity of the femur. These growths usually are not large, are slow in formation, are rarely painful and do not affect the patient's general health. Their attachment to the bone is usually not large and their removal can be successfully accomplished. They should be resected on account of pressure symptoms or limitation of joint motion; otherwise, operative treatment should not be advised.

HEMANGIOMA.

Hemangiomas give good reasons for surgical treatment when the growths are small, are superficially located and disfigure the patient, and are rapidly increasing in size. It is true that while the more serious and extensive of these growths call for removal, the results of surgical treatment have not been encouraging in dealing with some of these serious bloody tumors. Another objection to complete removal of these growths lies in the fact that it is impossible or difficult to close the defect, as a large area of skin is frequently affected. If there is good reason to understand, from the location and the extensiveness of the tumor, that complete extirpation would be dangerous or would be followed by serious deformity, the injection of hot water into the tumor, as recommended and practised by Wyeth, might be given a trial. This method is probably not free from danger and its advantages have not been accurately determined.

If these growths are large, rapidly-growing and there is reason to believe that complete removal would be dangerous, subcutaneous ligation, or ligation through an open incision, of the arteries that feed the tumor should be practised. If all the arteries that feed the growth can be ligated, pulsation may cease and atrophy occur. If these methods do not succeed in eliminating the blood supply a sufficiently

large number of arteries may be occluded to render a radical operation less hazardous.

The treatment by electrolysis is limited to the superficial and less extensive varieties of angioma. The smaller and slow-growing varieties of these vascular tumors are easily dealt with, while it may be extremely difficult or impossible to successfully treat a large hemangioma.

MALIGNANT GROWTHS IN THE EXTERNAL CAROTID AREA.

On account of the generally accepted view that malignant growths of the external carotid areas afford positive indications for operative treatment, and that the limitations of these operative procedures and the indications for or against radical removal are well known, a discussion of the various methods and the reasons for their performance, done for the removal of malignant growths of the face, will be omitted. It is true that many times a radical operation is not called for in dealing with these growths on account of the local extensiveness of the involvement, or because of metastases being recognized in other parts of the body. Sometimes palliative excisions may be of value in these growths, but should be performed only when it is possible to close an ulcerating and infected carcinoma. Many times the general condition of the patient can be improved and the local symptoms diminished to a marked degree if healthy skin can be placed over a superficial and ulcerating extensive malignant process. These operations are justifiable for the reason that they not only prolong the life of the patient but diminish, to a marked degree, the suffering.

Palliative operations for malignant growths involving the external carotid areas have been practised with more or less success by Dawbarn, Bristow and DaCosta. They depend for efficiency on shutting off the blood supply to these growths to a marked degree. The external carotid is occluded—either by excision or ligation of the branches of the artery, depending of course on the location of the tumor—then plugged with a mixture of one part of paraffin in nine of vaseline. Forty-five minims of this mixture can be used with safety in injecting the terminal branches of the external carotid, a short distance before the external maxillary and temporal are given off. It has been shown that it is not wise to inject the terminal portions of the

carotid and the occipital at the same time. Sloughing is likely to follow if this is done.

In advising these operations we should remember that the procedure is to be considered palliative and that a complete radical cure is not to be expected; that in most instances, if the operation is properly done, the growth will be diminished in size, and that the pain may often be mitigated. It is possible that tissue of a fibrous character may proliferate around the borders of the malignant growth, and thereby render a radical operation possible that could not have been done before the work upon the arteries. DaCosta has had such an experience.

XXXI. DEFORMITIES AND CONGENITAL DEFECTS.

SPINA BIFIDA.

The treatment of spina bifida is surgical. If the local and general indications are not such as to positively prohibit an operation, the radical operative treatment should be carried out at an early date. Nothing can be gained and frequently much is lost by delaying the surgical treatment. Although it is a fact that non-operative methods have been practised to a considerable degree in the past, they are being rapidly replaced by more radical operative measures. The method of Morton, and other methods which depend for their effectiveness on the use of chemicals, have no place to-day in the treatment of spina bifida. They are dangerous and their results are uncertain and by no means constant. When it has been decided that a surgical operation should be undertaken for a case of spina bifida nothing can be gained by delaying the treatment. These patients should be operated upon as soon as their condition will permit the giving of a general anesthetic. Undue delay is apt to bring about complications in the way of superficial ulcerations, infection or even perforation. These are of a serious character and should be prevented in all cases by early surgical work.

While it is true that some of the cases of spina bifida may give positive contraindications as to operative treatment, a large percentage of these defects can be remedied successfully if operations are done properly and are not delayed in their conduct. All cases of simple meningocele should be subjected to operation. The size of the meningocele is no barrier, neither is the size of the bony defect. Of course it is true that a large meningocele with a large opening in the spinal canal presents a more serious risk than does a small tumor and a small opening; nevertheless, operations should be advised for all regardless of the size of the tumor or of the bony defect.

Meningomyeloceles may, or may not, call for surgical treatment. If it can be determined that only a small portion of the nervous tissue is present in the sac, and there is reason to believe, from the absence of paralytic symptoms, that this is not involved in adhesions or not intimately connected with the sac, operation should be performed at

once. If, on the other hand, it may be inferred that a large amount of nervous tissue is intimately connected with the sac, or if paralytic symptoms are present, no operation should be undertaken. If there seems to be some doubt as to the advisability of a surgical operation on one of these cases, the patient should be given the benefit of the doubt and the operation performed. If the result is a fatal one it can be said that nothing has been lost, for without operative treatment death would be the inevitable outcome in a short time. On the contrary, if these doubtful cases are granted early operation, a life may be occasionally saved.

All cases of syringomyelia offer a positive contraindication to the performance of a surgical operation. All of these patients die in a short period, and, so far as known, none of them has been benefited by operative treatment.

Indiscriminate operations for spina bifida should be discountenanced. A certain proportion of these patients offer no reasonable hope at all and should therefore be left alone. For instance it will no doubt always be advisable to refuse operative treatment in any case in which paralytic symptoms are well-marked. The majority of these patients will succumb promptly, and if they survive the operation no improvement is to be expected in the way of relief from the paralysis. If a spina bifida has advanced to a stage in which the patient is marasmic, no operation should be attempted. Judicious selection of the cases that are given over to operative treatment would be productive of a very low mortality in this serious affection. The recorded cases that have been operated show clearly that indiscriminate operations have been followed by a large death rate.

If it has been decided that operative treatment is justifiable for spina bifida, extensive osteoplastic procedures are not required. Although these measures have been practised with success, it has been shown that equally good results can be obtained in a less radical way. Closure of the bony defect with soft tissue has proven eminently useful in the great majority of cases.

HYDROCEPHALUS.

The surgical treatment of both chronic and acute hydrocephalus is very far from satisfactory. The operative measures that have been advocated and practised for the relief of this condition do not meet the pathological indications. Therefore we should be careful in

advising surgical treatment for these cases. While the pathology of hydrocephalus remains an unwritten chapter we shall do well to discreetly select our cases for operative treatment. The mortality from all surgical procedures is notoriously high and recurrences are common after a surgeon has been fortunate enough to secure temporary amelioration of the symptoms.

Aspiration of the cerebral ventricles that has been practised extensively in the past should not be employed in most cases. Although it is possible that a good result may occasionally be obtained I am unable to find the report of a single case that has been satisfactorily and permanently cured by this method; which forces the opinion that aspirations of the cerebral ventricles should not be resorted to with the hope of relieving chronic cases of hydrocephalus.

Acute hydrocephalus that has followed an inflammatory condition, or that is dependent upon the involvement of the arachnoid alone, may present a fair reason for direct aspiration.

Lumbar puncture for the relief of hydrocephalus suggests the same chance for securing permanent results as does aspiration of the ventricle. The limitations and the advantages of this method have been pointed out in the chapter dealing with spinal puncture. It presents no advantages over other methods of draining, with the possible exception that it is easier to do and is less dangerous to the patient. As before stated it should not be undertaken if there is cause to believe that no communication exists between the cerebral ventricle and the subdural spinal space.

Subcutaneous drainage, advised and practised by Feiss, Turck, Senn and others has, on the whole, been more satisfactory than aspiration. It is, however, far from a hopeful method of treating these cases. It does not meet the pathological indications, but simply removes the fluid. A reasonable opinion would appear to be that it cannot be depended upon to produce marked, immediate or remote, good results. So far as I am able to determine no permanent cures have been effected by this method. Drainage into the peritoneal cavity in all probability will be found to be no more satisfactory than subcutaneous drainage.

Drainage from the cerebral ventricle in the subdural space, as advised and done by Southerland and Cheyne, offers no better chance of relief than subcutaneous drainage. It is probable that this method will not have a wide field of usefulness.

The injection of chemicals into the cranial cavity should not be employed in attempting to relieve cases of hydrocephalus. The method is dangerous, irrational, and can scarcely fail to produce unsatisfactory or inconstant results.

At the present day, we have no rational or legitimate treatment for chronic hydrocephalus. We are not reasonable in putting forward one operative procedure as a routine practice for these cases. So far, the operative measures have depended upon drainage to secure a permanently good effect. This does not correct the cause of the condition but simply attacks one symptom. Operative procedures advised for hydrocephalus cannot be recommended, except from an experimental standpoint. If any suggested operations are undertaken the prognosis should always be guarded and the possibility of an early fatal issue should never be overlooked.

CLEFT PALATE.

The treatment of cleft palate is eminently surgical. The results of the modern operations for this deformity are so decidedly encouraging, and the mortality so slight, that an attempted cure, by operation, should be advised to all of these patients.

The time at which these operations should be carried out has been, and is at present to a certain extent, an open question. The very early operation, practised so successfully by Brophy and others, is to be recommended provided that the general condition of the patient does not preclude. I believe that many times equally good results can be obtained by operating upon children who are from 4 to 6 years of age; and in some instances it seems advisable to defer operation in the very young, as mentioned by Ochsner.

In doing operations for cleft palate in children who have their "first teeth", preparatory treatment with mechanical devices should never be neglected if the deformity is of such a character that gradual mechanical treatment will be of benefit. Preliminary operations on the vomer are also necessary in certain cases. Many times they aid materially in obtaining a satisfactory ultimate result.

In performing operations for cleft palate that change the positions of the superior maxillary bones, care should be taken that one bone is not more displaced than the other. Deformity of the face, or unilateral nasal obstruction may follow if this precaution is not observed.

Operations for cleft palate in patients who are too old to admit of movement of the superior maxillary bones should be done by uranoplastic methods.

HARE-LIP.

Every case of hare-lip presents a demand for operative treatment. If a cleft palate exists, this should be operated upon before the hare-lip operation is attempted.

In many of these cases preparatory treatment should precede the operation. Much good can be done in some by bringing the parts into a more nearly normal position by properly applied strips of adhesive plaster before the lip is operated upon.

TORTICOLLIS.

The marked and permanent forms of congenital torticollis are best treated by operative measures. The non-operative treatment is unsatisfactory in all but the mildest forms of these affections, while operative care is, in almost every instance, successful. When it is considered that this deformity markedly inconveniences the patient, that it becomes more prominent as the patient advances in years, and that the radical operative treatment is not associated with danger and is productive of very desirable results, the advisability of early operation in these cases is apparent.

Subcutaneous or open division of the sterno-cleido-mastoid muscle cannot be relied upon to permanently benefit any case of torticollis. This operation should not be performed. The method that has given perhaps the best results in cases of congenital wry-neck consists of an excision of the lower half of the sterno-cleido-mastoid muscle, with dissection of all portions of the cervical fascia that interfere with placing the head in an over-corrected position. Operations on the nerves are not indicated in dealing with the congenital, permanent varieties of torticollis. It is considered that the operation on the fascia is more important than that upon the muscle; and dissection of the fascia should never be omitted in correcting marked and long-standing cases of this condition.

SPASMODIC TORTICOLLIS.

The exact nature of this condition remains at the present time undetermined; and the indications for treatment are controversial questions. It is believed that spasmodic torticollis is dependent upon

a cortical lesion; it is known that some of these cases recover spontaneously; it has been observed clinically that extensive operative procedures upon the muscles and nerves are followed by satisfactory and permanent results in a considerable number of instances, and that certain cases resist all forms of operative and non-operative care.

While it is impossible at the present moment to state the indications for operative treatment in cases of spasmodic torticollis, it is generally agreed that the most serious forms of this affection should be treated surgically. If the best results are to be obtained operation should be done early in the course of spasmodic torticollis, before habit spasm has developed to a marked degree.

Of the many operations that have been recommended and followed out for the relief of spasmodic torticollis, it is believed that only an extensive radical undertaking is consistent in attempting to cure this affection. Operations on the sterno-cleido-mastoid muscle or the spinal accessory nerve rarely cure these patients, and therefore such operations should not be done. If it has been decided to operate upon a case of spasmodic torticollis, not only the spinal accessory nerve and the sterno-cleido-mastoid muscle should be dealt with, but the second, third, and sometimes, the fourth cervical nerves should be resected, and the posterior groups of muscles should be divided. Extensive operations secure the best results. The muscular structures from the external occipital protuberance to the sterno-clavicular articulation should be incorporated in the operation. The reports of Richardson, Walton, Whitman and others, strongly suggest that very extensive and thorough operations are necessary in dealing with spasmodic torticollis, and that the results may be expected to be satisfactory and permanent if the operation has been sufficiently radical.

CLUB FEET.

The treatment of club foot in all of its varieties, or in any patient, is mechanical. The indications for operation cannot be put down with any degree of definiteness, for they depend upon the age of the patient and the extent of the deformity. I shall not attempt to give the various views of men who advise for or against operative treatment in the great majority of these cases, but shall simply state that from month to month, one's methods are apt to change in handling this class of patients, and that the particular view that one man holds

may depend upon the variety of deformity he has met most often during recent experience.

It must be remembered that club feet are seldom treated by one method; that while operation is usually indicated in long-standing instances, many old cases may be treated more successfully without operative measures than can other cases that occur in young children.

The mechanical treatment of club foot should begin as soon as the nutrition of the child will permit. No cutting operation should be done until the child is at least four years of age. Between the ages of four and twelve it is the custom to immediately over-correct the deformity. This can usually be done by manipulation, either with the hand or with the aid of certain mechanical appliances. Tenotomy may occasionally be required to overcome a deformity in one under twelve years of age, but it is seldom or never necessary to do a bony operation on these patients. Briefly stated, the treatment in children over four years of age should be immediate correction of the deformity. If this can be accomplished by manipulation no cutting operation should be done. If manipulation is insufficient tenotomy should be employed and osteotomy of the head of the astragalus if necessary. Bony operations on the astragalus may occasionally be required, but further operation on the tarsal bones, and especially the removal of bones, will rarely be advisable, particularly in dealing with young patients. In treating an adult, bony operations are more often necessary than in children.

While it is doubtless true that the operative treatment for club foot is becoming less frequently demanded, on account of the earlier and more efficient mechanical treatment that is being generally employed, immediate over-correction should be the treatment of choice in all well marked cases occurring in children over six years of age. The deformity should be over-corrected and if this can be done without a cutting operation no incision should be made. If this cannot be accomplished without operation upon the soft and bony structures the work should be done at once. Everything should be accomplished in the way of an open operation that is necessary to allow the foot to be placed in an over-corrected position, and to remain there without tension or tendency to recurrence of the deformity.

BOW LEGS.

The indications for operative treatment in cases of bow legs are dependent upon the extent of the deformity, the age of the patient, and not infrequently on the etiology. Mild degrees of deformity involving the bones of the leg that occur in young children as the result of rickets, can, as a rule, be treated successfully by the use of properly fitted appliances. This is true, to a certain extent, in the more gradual varieties of osseous deformity that occur in children who are not over twelve years of age. If the deformity is angular, or is marked and at the same time the bones are strong and are not undergoing rapid changes, direct operative measures will probably be the only means of curing the deformity. Subcutaneous fracture, with or without the use of especially made apparatus, has been practised successfully in these cases. It is probably true that while this method gives entire satisfaction in some, incision with osteotomy, followed by fracture and holding the fragments in an over-corrected position with a plaster-of-paris dressing, will be found more efficient in the great majority of these cases, especially if the deformity is angular, or if it is gradual, but marked. The opinion is given that when these cases are to be dealt with in adults osteotomy over the convex portion of the deformity should be the method of choice in all cases. The traumatism to the tissue is less, while the fracture is invariably produced in the desired location. Recurrence of the deformity will seldom take place if the osteotomy has been properly performed and the limb has been encased in an over-corrected position.

Angular deformity of the bones of the extremities that has resulted from injury or from pathological fractures are best treated by osteotomy. A simple transverse osteotomy, followed by fracture, will usually be efficient in these cases if the deformity is angular, is limited to one place in the bone, and is very marked. A cuneiform osteotomy should be the method of choice.

These subcutaneous osteotomies are easily and quickly done, are not associated with any degree of shock, are not likely to become infected, secure satisfactory results, and are followed by prompt reunion of the artificial fracture.

KNOCK KNEES.

What has been said regarding the call for operative treatment in cases of bow legs, applies to a great extent, to cases of genuvarum

and genuvalgum. If the deformity is due to osseous changes above the knee joint an external or an internal transverse osteotomy, followed by fracture and slight over-correction of the deformity, should be the operation of choice, unless the deformity is slight, the patient young and the bones seem in a condition to yield readily to mechanical, non-operative treatment. In all of these cases especial care must be taken to determine that the change is not located close to the head of the tibia instead of in the femur.

Although a few men have practised subcutaneous separation of the tibial epiphysis in some of these deformities of the tibia, it has been shown that this method is apt to be followed by marked weakening, or even complete laceration of the ligaments of the knee joint. For this reason, and on account of the difficulty of producing subcutaneous fractures without osteotomy in adults, it is probable that the linear transverse osteotomy will be the operation of choice in all varieties of knock knee that produce sufficient deformity to require operative treatment, and that occur in patients whose bones would not respond to gradual correction of the deformity.

CONGENITAL DISLOCATION OF THE HIP.

The treatment of this condition has been so thoroughly discussed during the last few years that a repetition of what has been said regarding the indications for operation, the results obtained, and the best method of operating would seem superfluous. It is sufficient to note that the great majority, if not all, of these cases warrant manipulative or open treatment, if the patient is observed while at an age that would not contraindicate an attempt at a reduction of the dislocation.

The benefits of bloodless reduction in these cases have been overestimated. The perfect results have dwindled to ten per cent., while the "functionally good" results do not exceed fifty per cent. When we remember that the operation, to be successful, is associated with considerable danger; that the after treatment is prolonged and trying; and that the number of permanent good results is not large, we should consider carefully cases of congenital dislocation of the hip before advising to attempt reduction.

Although there are many objections to the manipulative treatment of congenital hip disease, the bloodless method is perhaps to-day

the operation of choice to relieve these patients. This is especially true when the condition is bilateral.

Reduction of these dislocations by the open method has been practised with varying success for a long time. The reports of Sherman suggest that open operative treatment may become the method of choice in a certain number of these cases. Open operation should be undertaken when it is impossible to reduce the dislocation by subcutaneous manipulation. It is probable that the cutting operation will be found the most efficient method that we have to-day in cases of congenital dislocation of the hip in which a portion of the capsule must be extensively torn in order to reduce the dislocation. A case of anterior transposition has also been treated successfully by open operation.

CONGENITAL DISLOCATION OF THE SHOULDER.

While it is probable that this uncommon deformity can be treated successfully only by surgical measures, yet it may be possible for systematic manipulation to accomplish reduction of the dislocation and that a successful result may be obtained by this method. As a rule, however, the condition has resulted from or is associated with, marked deformity of either the head of the humerus, the glenoid fossa, or both of these structures. In consequence of this reason, it is more than probable that open operation will be required in most of these cases. Operation is indicated if less radical measures fail in reducing these dislocations. The theory of Guerin and Verneuil that the dislocation is the result of infantile paralysis has proven to be untrue. In the majority of these cases the muscles are not paralyzed, but marked changes are found in the bony articular surfaces.

Operation should be done early in relieving this condition, as the results are much better if the operation is conducted before the muscles are well developed, and again in the early stages the operation is easy to perform.

The operation devised by Phelps, which consists of incision into the joint, remodeling of the head of the humerus to fit the glenoid cavity, followed by resection and suturing, is generally regarded as the one of choice. The advice of Marsten and Phelps that it is necessary to cut away about two-thirds of the head of the bone should not be followed in all cases. In some of the operated cases bony resection was unnecessary. The extent of operation, however, cannot be deter-

mined before the joint is exposed; resection should or should not be done according to the depth and size of the glenoid cavity, and the size and shape of the humeral head. It is reasonable to hold that if the articular surfaces of the joint do not fit fairly accurately, or if there is a disproportion in their size, bony operative measures should be performed on the humerus instead of attacking the glenoid cavity. Only in exceptional cases should any operation be carried out on both articular surfaces. Such measures are apt to be followed by ankylosis of the joint, and should be advised against. The method of opening the shoulder joint in cases of congenital dislocation, or in doing operations for other conditions, has been a much discussed point. It is probable that a posterior or superior incision is preferable to an anterior, or to an incision in the axilla. A superior curve or transverse incision perhaps gives the best exposure and there is little risk of injuring important structures. The posterior incision of Phelps has doubtless been the most extensively used in dealing with congenital dislocation.

From the reported cases congenital dislocations of the shoulder treated by operation are too few upon which to rest positive statements regarding the ultimate results that have been obtained. Our knowledge of the pathology of the condition and the results so far effected by operative measures are sufficient for us to consider this condition as one indicating operative treatment, and in most instances giving consequences proving the value of timely surgical undertakings.

MORTON'S (THOMAS G.), PAINFUL AFFECTION OF THE FOOT.

The nature of this disease is still unsettled, and therefore we are unable to discuss the indications for its treatment with any degree of certainty. In 1876 Morton first described this condition. He believed that the pain was caused by the pressure of the metatarsal bones on branches of the plantar nerves. He described a branch of the plantar nerve encircling the head of the fourth metatarsal bone. He treated successfully fifteen of these cases by resecting the head of the fourth metatarsal. Since Morton's report many of these cases have been treated successfully by his method.

At the present time the pathology of this affection is obscure. The modern French school denies the existence of this disease as an entity. They maintain that all of these cases are due to local inflam-

matory lesions or to injuries. They believe that trauma, syphilis, tuberculosis and similar inflammatory processes are responsible for the symptoms in all instances. American observers who have given this subject more attention, seem to have proved positively that Morton's disease should be looked upon as a distinct pathological state, and that the theory of Morton can no longer be relied upon. The observations of A. E. Halstead, Goldthwaith, Whitman and others have proven quite conclusively that this disease is a purely static condition of the transverse arch of the foot, and that it is analogous to painful flat foot. The observations of Halstead show that the branch of the plantar nerve described by Morton as encircling the head of the fourth metatarsal is commonly not present.

The treatment of this ailment based on the pathology indicated in the foregoing has been very successfully carried out by the use of mechanical appliances. The sole devised by Whitman has given relief in most instances. No operative procedure should be undertaken to relieve this condition until a well fitting shoe and a properly made metal support are given a long and thorough trial. If these measures fail to give relief resection of the bone should be undertaken. This operation, though not serious in itself and productive of good results in the great majority of instances, will rarely be performed at the present time for this static condition of the foot if these patients are carefully studied and mechanical appliances properly fitted.

DUPUYTREN'S CONTRACTION.

All advanced cases of Dupuytren's contraction should be submitted to operation. It has been shown by the reports of the cases operated by Keen, Nichols, McWilliams and others, that permanent and complete relief is obtained in all of these cases if operated upon properly. No one, so far as known, has reported cases of failure to secure satisfactory results when Dupuytren's contraction has been treated by removal of all of the fascia and connective tissue involved in the disease.

On the other hand it is generally understood that nothing short of radical operation gives complete and permanent relief. The reports of Eulenberg, describing favorable results from electrical treatment, are by no means convincing. His cases have not been followed long enough to warrant a decision on the permanent efficiency of his method. The cures following massage, so warmly advocated by Mosen-

geil, are marked exceptions to the rule. His cases were doubtless of a mild character, and the condition not of long standing. The majority of the authorities on Dupuytren's contraction supply us with facts, and the reports of cases that clearly indicate that complete and permanent relief can only be obtained by operative treatment.

Although the radical cure of Dupuytren's contraction is almost universally successful, there occasionally exists a contraindication to operative treatment. General conditions of so serious a character as to prevent general anesthesia are not contraindications to advising the radical treatment. Local or neural anesthesia, as has been shown by Keen, is quite sufficient for this operation. In beginning cases it may be wise to give the massage and mechanical treatment a fair trial before advising operation. No promises, however, of securing a permanent result should be made unless the radical treatment is instituted.

It is more important, in treating Dupuytren's contraction, to know what operation should be done than to know that operative treatment is always necessary to secure satisfactory results. The operative procedure advised by Gueretin and Malgaigne, which consisted of tenotomy of the muscles, does not meet the pathological indications. Subcutaneous division of the fascia, advised by Adams and Cooper, will give satisfaction in only a limited number of cases. The rational treatment of to-day, as advised and practised by Kocher, Busch and others, is based upon the well known pathology of the condition. Long ago, Goyrand, Froriep, Sevestre and Adams, and more recently, Kocher, Langhans, Tarnowski and Schmidt, conclusively pointed out that Dupuytren's contraction is a chronic hyperplastic inflammation, with subsequent scar tissue contraction of the palmar fascia and of the adjacent connective and fatty structures. If we wish to secure complete and permanent relief in these cases, we must not only entirely remove that portion of the palmar fascia involved in the disease, but we must also divide or excise the fibrous bands along the sides of the digital tendons. This operation is, so far as I know, always followed by complete and permanent benefit. A careful study of the recurrences that have followed this operation strongly suggests that the development is the result of retarded complication of portions of the palmar fascia that were not affected by the disease at the time the operation was done. In operating upon cases in which only a portion of the palmar fascia is involved in the

disease, we should inform the patient of the possibility of a later extension to the healthy fascia that was not removed at the time of operation.

HAMMER TOE.

This deformity can be treated successfully only by mechanical measures. Mechanical appliances capable of producing apparently temporary benefit in beginning cases of hammer toe, are useless in dealing with this deformity when it is well developed. Operative measures are indicated in cases of hammer toe that cause marked pain or otherwise inconvenience the patient.

The only operative procedure that can be depended upon to relieve these patients is amputation of the affected toe. Tenotomy is useless, while resection of the inter-phalangeal joint cannot be relied upon to materially benefit any intractable case.

HALLUX VALGUS.

Non-operative treatment is of little avail; it should never be advised in well advanced cases of hallux valgus, and is positively contraindicated in all cases associated with an inflamed bursa over the head of the metatarsal bone. In beginning cases of hallux valgus that do not produce pain and are unassociated with osseous changes, mechanical appliances may prevent the progression of the deformity.

All cases of hallux valgus that markedly inconvenience the patient, or are associated with bunion, give positive indications for operative treatment. The presence of arthritis deformans or even a gouty predisposition does not contraindicate operation.

In all operations for the relief of hallux valgus there are certain factors that must be taken into account. The bursa should always be removed; the enlarged inner part of the distal end of the first metatarsal bone should be excised; the extensor tendon should be lengthened or divided in order to prevent a recurrence of the deformity; and all portions of the capsule of the joint should be divided if they interfere with retaining the toe in proper position. Operative procedures that shorten the toe, that do away with the bony support of the ball of the foot, or that are likely to be followed by ankylosis of the joint are not indicated in treating hallux valgus. Resection of the head of the metatarsal bone should not be undertaken in any case of hallux valgus. No operation on the first phalanx is permissible in these cases. Removal of the bursa and the inner part of the metatarsal, with

elongation of the extensor tendon is quite enough in all but a few cases of hallux valgus. In a small percentage of these cases it is advisable to not only remove the bursa and affected bone, but to divide the ligaments at the outer side of the joint and suture the extensor tendons of the great toe to the periosteum, or the inner side of the base of the first phalanx.

The removal of sesamoid bones is indicated in operating upon exceptional cases of hallux valgus. A sesamoid bone that is displaced or interferes with retaining the toe in proper position should be removed.



XXXII. SO-CALLED MEDICAL DISEASES.

CHRONIC DYSPEPSIA DUE TO DEFECTIVE DRAINAGE, AND CHRONIC INFLAMMATION OF THE STOMACH RE- SULTING FROM GASTRIC ATONY AND DILATION.

A not infrequent cause of disagreeable and very obstinate dyspeptic symptoms is gastric atony followed by chronic gastritis, moderate dilatation, and defective drainage of the stomach. These conditions, when of long standing, give rise to almost continuous dyspeptic symptoms associated with secondary neurasthenia of more or less severity and chronic constipation. Gastroenterostomy, with closure of the pylorus, will give these patients complete and permanent relief, not only from the stomach symptoms but also from the neurasthenia and constipation.

While one may not accept the foregoing statements as conclusive, nor be able to present proof that will be fully convincing, still if we bear these statements in mind we shall occasionally find a chronic sufferer whose condition corresponds to them, and who can be radically and permanently benefited only by surgical interference.

It is generally admitted that fatigue of the gastric muscle, followed by gastric atony, elongation of the gastric muscle fibres, and consequently enlargement of the stomach cavity, does occur. Turek, Kemp, Rose, and others have studied the occurrence of the loss of tone of the gastric muscle in detail. When the condition is only of temporary duration its importance is overlooked; and in these cases special attention has been given to the secretory derangements of the organ as a cause of the symptoms. When the muscle tonus of the stomach is lost for a considerable period of time, clinical treatment does not relieve the symptoms. This fact has led observers to study disturbances of the motor functions of the stomach and to pay less attention to secretory derangements and chemical treatment. Mayo says that "It is the mechanics of the stomach that is usually at fault and not its chemics; and it is for this reason that surgery is rapidly invading the field." Of course, secretory disturbances of the stomach occur, associated with motor disorders, and independently of them; but they are doubtless of secondary importance in producing symp-

toms. In fact, Einhorn has shown that even achylia gastrica can occur and produce no symptoms if the motor function is not impaired.

If we attribute the symptoms of some cases of chronic dyspepsia to primary muscular atony and insufficiency, the succession of changes in these long-standing cases would seem to me to be the following:

The continuous atony of the stomach musculature results in incomplete emptying, or deficient drainage, of the organ, either from a resulting pouch formation, or from lack of muscular force to expel the stomach contents. The material that remains in the stomach undergoes chemical changes resulting in the formation of products that have a local effect on the gastric mucosa, and being absorbed are capable of producing more or less markedly general changes. The local changes produced in the stomach are very likely to cause a chronic inflammation of the mucosa, which of course would be responsible for the symptoms of a chronic gastritis.

The general changes due to absorption of chemicals from the stomach may vary greatly in their effect and intensity. Secondary anemia, which, as Hunter has suggested, may advance to pernicious anemia, might occur. Of other possible conditions that might result from absorption of toxic stomach contents, mention only need be made of those due to involvement of the nervous system.

We have for some time recognized severe cases of tetany due to stomach toxemia. Examples are recorded by Cunningham, Robson, Fleiner, Carnegie, Albu and others. There can be no doubt that nervous symptoms, less severe than tetany, can and do occur as a result of defective gastric drainage. The opinion seems tenable that the neurasthenia, so commonly associated with chronic dyspepsia, is not primarily dependent on some change in the nervous system, but is the result of the action of toxic products absorbed from the stomach. The theory that the nervous symptoms are primary, and that the dyspepsia is secondary and dependent on a primary nervous disease, is improbable. We must admit, however, that lesions in the nervous system are capable of producing stomach symptoms and definite gastric changes. Carion and Hallion found that section of the vagus nerve was sufficient to produce complete atony and permanent dilatation of the stomach of a dog. Pawlow and Katschkowsky have shown that cutting even both vagi nerves produces only a temporary disturbance of gastric movements. These and many other experiments, though not without value, are by no means convincing. Regarding them.

Ewald says, "Yet all these experimental stimulations in mammals have an indefinite and uncertain character; their success is not great, and by no means constant."

On the contrary we have examples of tetany being relieved by drainage of the stomach; and we also have examples of the disappearance of nervous symptoms following drainage of the stomach for obstructions of the pylorus. I think that we can safely say that it is probable that many times a neurasthenia is present as the result of absorption of toxic products from a stomach that does not drain properly.

Another symptom that is usually complained of by patients suffering from gastric atony, inflammation and defective drainage, is chronic constipation. The cause of the constipation might be due to the small amount of solid material that these patients usually pass into their intestines. Lohrsh says that the absence of a sufficient quantity of dry residue in the intestines inhibits the growth of the intestinal flora and diminishes the production of indol, skatol, etc. The absence of sufficient quantities of these stimulants of the bowel explains the constipation. It is believed that the constipation in these cases is not accidental, or due to independent causes, but is the result of the defective drainage of the stomach. Gastroenterostomy usually cures the constipation in these patients. Waterhouse reports thirty-one cases of gastroenterostomy in those suffering from defective drainage of the stomach and chronic constipation. In all of them no constipation existed after the operation. Murphy and Ochsner have not seen cases of constipation following properly done gastroenterostomies, unless produced by some definite local cause.

The recognition of defective drainage of the stomach due to chronic gastric atony and inflammation is made from the symptoms of chronic dyspepsia associated with neurasthenia and chronic constipation, and, by excluding other stomach lesions that would produce similar symptoms. Obstructions of the pylorus, displacements, ulcer, tumors, and deformities usually present some symptom more or less characteristic of the exact condition present. I shall not go into the symptomatology or diagnosis, but be content with making a statement regarding the indications for operation in these cases.

Any case of severe and long-standing dyspepsia that resists all generally advised methods of treatment, and that shows no permanent improvement after giving the stomach absolute rest for two

weeks by rectal feeding, should be submitted to a laparotomy. This advice may be too radical to accept in the light of present-day circumstances, but it is believed, from the statements of Kemp, Cramer, et al., advising operations on the stomach, that we shall lose little if we follow it.

If we can relieve these cases by gastroenterostomy and if the good results following gastroenterostomy for benign conditions prove to be permanent, we are justified in advising operation for all serious cases of chronic dyspepsia that will not yield to less radical methods.

(I have operated upon three cases of chronic dyspepsia resulting from gastric atony and defective stomach drainage. The relief was complete, not only from the dyspeptic symptoms, but also from the neurasthenia and the constipation. A detailed report of these cases was published in *Annals of Surgery*, January, 1905.)

MUCO-MEMBRANOUS COLITIS.

A few years ago, muco-membranous colitis was generally esteemed to belong entirely to the domain of internal medicine; to-day its classification is uncertain, but in a few years I believe that the most severe cases of this affection will be considered as belonging to those diseases that are best treated by operative interference.

As the nature of muco-membranous colitis is unknown it is quite impossible to state that it should be treated as a surgical disease in all of its forms. It is true that in the majority of instances medical and local treatments are of little avail. Nevertheless, it is probable that these measures will relieve some of these cases. On account of the uncertainty concerning the nature of the disease; on account of the unsatisfactory state of its medical and local treatment; and in view of the small number of cases that have been subjected to operative treatment, I do not think that it will be out of place to discuss briefly the nature of the condition before making definite statements regarding the indications for surgical treatment, or the operation that proves most satisfactory.

There are two opinions generally accepted regarding muco-membranous colitis. One held by many is that the ailment is a secretory neurosis, and is dependent entirely upon a primary change in the nervous system. The neurasthenia that is associated with these chronic cases is believed to be primary, and the local changes in the bowel secondary to it. If I may venture an opinion it is that the

neurasthenia is not the cause of the muco-membranous colitis, but that it is secondary and dependent upon the local changes in the bowel. Tuttle and many others hold this view, and the reports of the operated cases for the relief of muco-membranous colitis suggest strongly that the nervous element of the disease is entirely secondary, and that the nervous symptoms are in no way responsible for the pain, or for the passage of membranes. Accepting this theory as an explanation for the occurrence of muco-membranous colitis, these cases may be divided into two classes; first, primary cases of muco-membranous colitis in which the condition is a primary inflammation involving the large intestine; and in which there are no pathologic changes of significance outside of the colon; the second division consists of cases of muco-membranous colitis in which there exists an inflammatory condition of the mucosa of the colon that is secondary to inflammations, adhesions, new growths and traumatisms, that involve structures other than the colon itself. The reports of Tuttle, Wyeth and a number of others, support the theory that a typical muco-membranous colitis can and does exist secondary to conditions not directly involving the colon. Inflammations of the appendix, pelvic adhesions, pressure from aneurysms or traumatisms from movable kidneys have been known to produce quite typical examples of muco-membranous colitis.

The surgical treatment of muco-membranous colitis, when considered under the foregoing divisions, resolves itself into two methods. Cases of primary muco-membranous colitis should be subjected to right inguinal colostomy, or Weir's operation, when they are severe, when of long standing, and when they resist local and medical measures. The results of the operated cases are very encouraging indeed. They show plainly that these affections, in all probability, can be entirely and permanently relieved by performing the simple operation; they show, also, that the neurasthenic symptoms may be expected to disappear if the colon becomes normal.

The surgical treatment of the secondary forms of muco-membranous colitis depends entirely upon the pathologic process present. A chronically inflamed vermiform appendix should always be removed if a colitis exists. Tuttle has treated many cases successfully by this method and I have succeeded in permanently relieving six of these sufferers by simply removing the inflamed and cone-shaped appendix. If a patient who is suffering with a membranous colitis has a markedly

movable kidney, pelvic adhesions, intra-abdominal inflammatory conditions, or any abnormality that affects the colon, this should be removed by operation, if possible. If after this has been accomplished the colon symptoms do not disappear, inguinal colostomy should be done without delay. From a study of the cases reported by W. Hale White, Keith, Robson, Elder, Sullivan, and others, there is reason to believe that the opening in the bowel should be kept patent for a period of some months. In the majority of the serious cases the fistula should not be allowed to close until there is every reason to be convinced that the mucosa of the colon is normal.

Although, as was stated in the foregoing, the treatment of muco-membranous colitis cannot be viewed to-day as being strictly surgical, the observations made touching the nature of the condition, and of the results obtained by operating upon these cases, suggest to us that we are acting along the right line in advising surgical operation for every severe case of this disease that resists medical and local measures. The operative treatment is not serious, it seems to have given universally good results, while all other methods are notoriously uncertain in their benefits and cannot be relied upon to completely cure any case.

EPILEPSY.

The operative treatment of epilepsy has been practised so extensively and for so many years, the results have varied so much, and the selection of cases many times has been so careless that I believe there is nothing to be gained by quoting in detail the past experience in this line of work, or in recording the results of operated cases or the operation that has been most often performed. At present the pathology of epilepsy in most of its forms remains an unwritten chapter. This being true one should select with great circumspection all cases for operative treatment.

JACKSONIAN AND FOCAL EPILEPSY.

Surgical treatment is positively indicated in certain carefully chosen cases of focal epilepsy and epileptic convulsions that can be shown clearly to have followed injury. If there is cause to believe from the history of the epileptic attacks and the findings on examination that the epilepsy is the direct result of injury to the brain cortex or skull a craniectomy is positively suggested. The operation

should consist of removing depressed bone and a cortical excision if the brain substance seems abnormal.

In cases of focal epilepsy showing no history of injury operation should rarely be undertaken. If the symptoms point clearly to involvement of a definite portion of the cerebral cortex, if the family history of the patient is good, and there is no reason to suspect congenital mental defects exploratory craniectomy may be performed. Cortical excision of the supposed diseased area should be the operation of choice in dealing with these cases. The opinion is offered, however, that if no abnormal condition can be found on exposing the cortex, excision will rarely do good and should not be performed.

SO-CALLED IDIOPATHIC EPILEPSY.

Cases of idiopathic epilepsy rarely exhibit indications for surgical treatment. We do not know the nature of this condition and we know little regarding the method for relieving the symptoms. The isolated reports of complete recoveries following various surgical operations, and the observations resulting from a large number of cases subjected to operation, are at the present time distinctly inadequate to warrant us in advising operation for these patients, or in saying that one operative procedure is more valuable than another in giving them relief. Operations on various portions of the body for the relief of deformities, or conditions that doubtless irritate the nervous system, are justifiable in epileptics, but should not be performed with the idea of curing epilepsy.

During the last few years much has been said and written regarding operations on the cervical sympathetic ganglia for the relief of epilepsy. The reports of Jonnesco, Winter, Pean, Bogdanik, Jaboulay and others by no means convince us that these operations have solved the problem of the pathology of epilepsy, or that the results obtained by them suggest this method of treatment as expedient. The opinion is expressed that operations on the cervical sympathetic ganglia for the cure of epilepsy should be applied only to cases in which the vaso-motor changes are very prominent. If vaso-motor dilators give these patients relief I believe, as Vidal has suggested, some benefit may be expected by operating upon the sympathetic. In all other cases little can be expected from these procedures.


TETANY.

Tetanic spasms, resulting from and dependent upon stomach toxemia, have been known to occur since Kussmaul, in 1889, first gave a description. It has been shown that tetany of this character is a serious disease, and that it is followed by a mortality of eighty per cent. when treated medically. The results of surgical treatment reduce this mortality to something like thirty-seven per cent. It has also been pointed out that in most of these instances the tetany occurs in a patient whose stomach is obstructed at the pylorus, usually by benign conditions, occasionally, as was reported by Trevelyan, Bouzere, by a malignant growth.

The tetanic spasms in these cases correspond more or less definitely to cases of tetany resulting from other causes. The symptoms of Trousseau, Chvostek, Erb and Hoffman are usually present. The recognition of the condition is not difficult and the treatment in all severe cases should be operative.

Although it is generally believed that tetanic symptoms in these cases result from stomach toxemia, dependent upon defective drainage of the organ, this is not positively known to be so. The theories regarding the etiology of gastric tetany advanced by Kussmaul, Germain See, Serlizheimer and others, and those theories that have been supported to a certain extent by experimentation, cannot be accepted as conclusive, and for this reason will not be discussed. It is sufficient to say in this place that in all probability gastric tetany is dependent upon pyloric obstruction in the large percentage of the cases. that operative treatment offers the best chance of permanently relieving these patients, that the operation most generally performed has been gastro-enterostomy, and that the reported operated cases suggest that the surgical treatment is positively indicated in all cases of gastric tetany.

Other varieties of tetany should be differentiated from gastric tetany, and should not be subjected to operative treatment. As a rule tetanic spasms occurring in gastro-enteritis, pregnancy, thyroidectomy, acute fevers, carpo-pedal spasms associated with rickets and other forms produced by toxemia from lead and morphine, are easily recognized. They are not usually confounded with gastric tetany, and of course present no indications for surgical treatment.



GOUT.

It is improbable that surgery will ever be of marked benefit in dealing with most cases of gout. From the reports of Riedel, who has removed gouty deposits from joints in two instances, it may be that in certain cases we are justified in removing infiltrations in gouty joints. If there is occasion to believe, from the clinical symptoms and findings in the case, that the disease is localized in one or more joints and that the presence of deposits is responsible for the pain and suffering, operative measures should be undertaken with the idea of removing these foreign bodies. The cases operated upon by Riedel were completely relieved and remained well for a period of six to twelve years. On account of the extreme suffering that some of these patients are obliged to contend with, and from the fact that the operation for removing gouty tophi is practically without danger, the operative treatment of gout should be thoroughly considered in all localized cases that are of long standing and are not associated with marked changes in the general system. It is advised that in doing these operations a portion, at least, of the capsule of the joint be removed, and that it is best to leave the wound open.

ACTINOMYCOSIS.

Actinomycosis in man is a disease that in the last few years has proved an exception to the rule in that, while formerly operative treatment was supposed to be indicated in relieving these cases, to-day operation is no longer considered advisable, and should be resorted to only in exceptional instances to open localized collections of pus or to deal with secondary infection.

When the disease involves the jaw medical treatment is usually sufficient to secure a permanent result, unless extensive bony necrosis has developed from mixed infection. In these cases abscesses should be opened and necrosed tissue removed.

Abdominal and pulmonary actinomycosis do not afford indications for operative treatment unless localized collections of pus exist. These should be relieved by drainage, but it is not necessary that vascularized actinomycotic tissue should be removed. The internal administration of potassium iodide will, as a rule, be found more efficient than operative measures in all cases of actinomycosis that have a vascular supply. Operative treatment is indicated only to

drain the localized collections of pus, or to remove dead tissue, in any case of actinomycosis.

The injection of silver and its various salts into an actinomycotic area is highly recommended by Von Baracz. The treatment of this condition by the X-ray has also been suggested by some, and in a few cases has been carried out with success.

ASTHMA.

The advisability of operations in the nasal region for the relief of asthmatic attacks is an unsettled question. It has been shown for years, or generally believed as being true, that there exists a definite connection between bronchial asthma and nasal affections. Vottolini, Hachedaly and others long ago called attention to this relationship. At the present time, however, there is a difference of opinion regarding the wisdom of operations on the nose and naso-pharynx with the idea of relieving asthmatic attacks. It is probable that a very limited number of cases of asthma are dependent upon nasal affections. As a rule, however, we are not justified in recommending operative procedures to relieve asthma alone. It is well to suggest to the patient that relief has been known to follow such operations and that they should be performed on account of other indications, but I feel that we shall many times be disappointed if we convey the idea that operations on the nose and naso-pharynx may be expected to be followed by a cessation, or even an improvement, of the asthmatic attacks.

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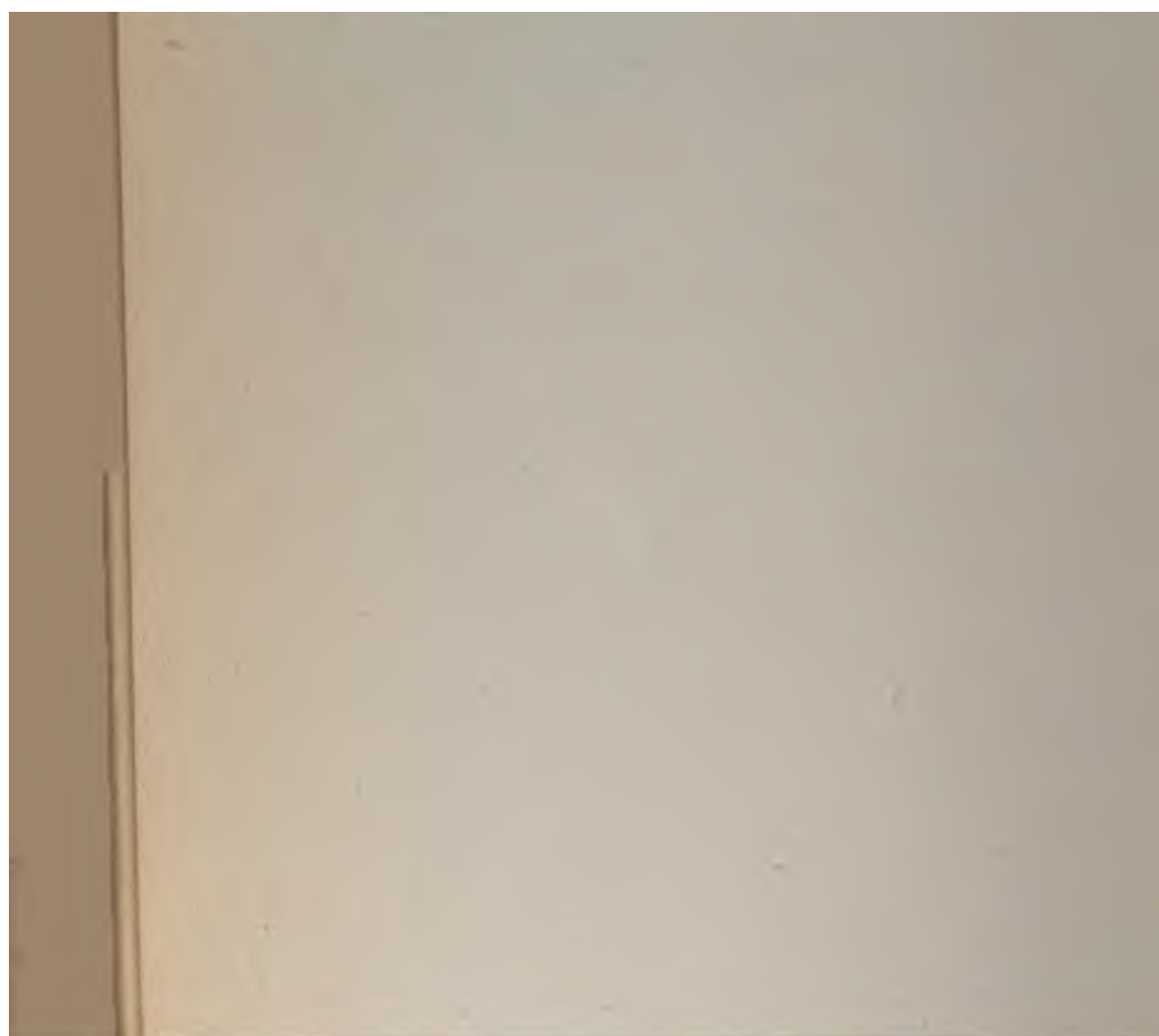
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